September 29, 1947

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

EDITORIAL INDEX, PAGE 39

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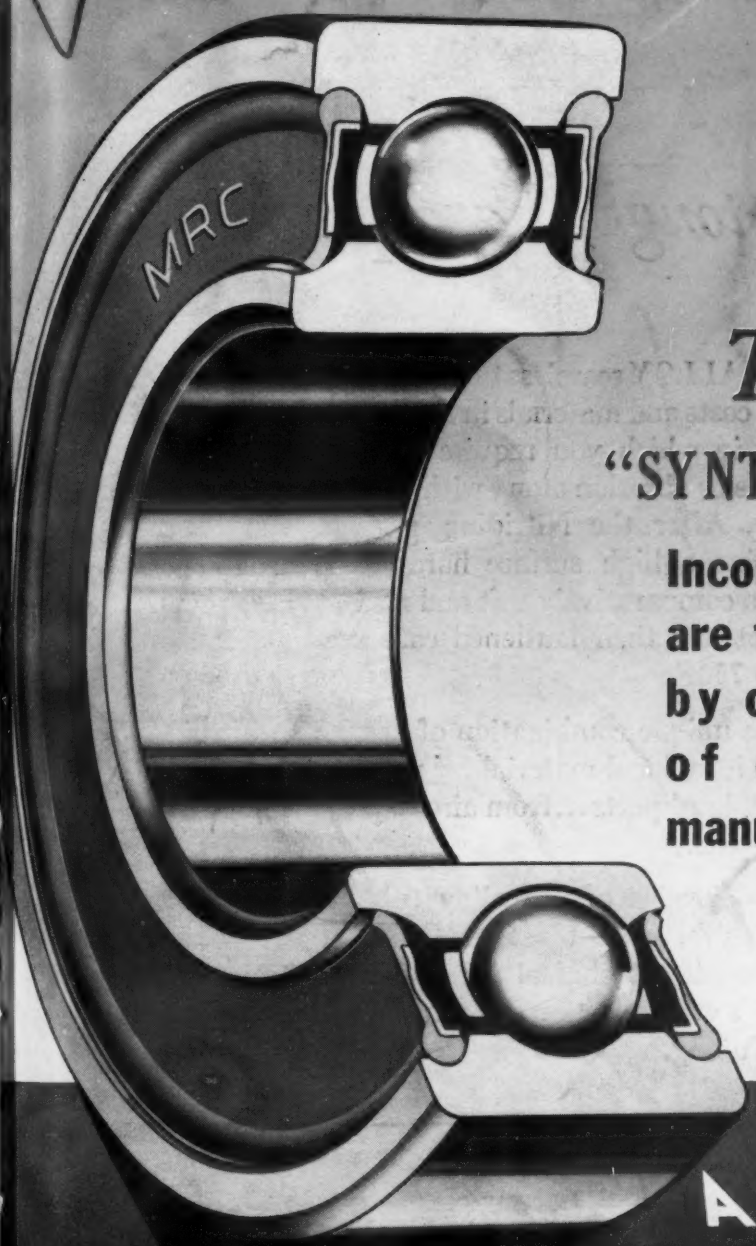

The M-R-C

"SYNTHE-SEAL" BEARING

Incorporated in this bearing are the refinements gained by over a half century of experience in the manufacture of ball bearings

A STANDARD-DIMENSION BALL BEARING WITH A REMOVABLE SYNTHETIC RUBBER SEAL IMPERVIOUS TO OILS AND GREASES

MARLIN-ROCKWELL CORPORATION, JAMESTOWN, N.Y.

CALL ON B&W for...

NITRALLOY mechanical TUBING

...a short-cut to tough, hard parts

PROPERTIES

	Nitralloy No. 135 Type "G"
Carbon	.30 — .40
Manganese	.40 — .60
Silicon	.30 — Max.
Chromium	.90 — 1.40
Aluminum	.90 — 1.40
Molybdenum	.15 — .25

	Nitralloy No. 135 "Modified" (Aircraft Spec.)
Carbon	.38 — .45
Manganese	.40 — .70
Silicon	.30 — Max.
Chromium	1.40 — 1.80
Aluminum	.95 — 1.35
Molybdenum	.30 — .45

NITRALLOY seamless tubing will save you considerable time, costs and materials in machining hollow cylindrical parts in which you require great resistance to wear, seizure or abrasion along with toughness and high durability. After the Nitriding process, Nitralloy parts combine a high surface hardness (960-1140 Vickers) with a comparatively soft and resilient inner core. They do not lose their hardened case even at temperatures up to 750F.

The unique combination of properties in this tubing make it an ideal material for making scores of different tough, hard parts...from aircraft engine liners to husky wrist pins.

Two grades of Nitralloy tubing are available for mechanical uses—135(Type G) and 135(modified). Send for complete technical data on this latest addition to B&W's wide selection of Seamless and Welded Mechanical Tubing.

Seamless and Welded Tubular Products in a full range of Carbon, Alloy, and Stainless Steels for All Pressure and Mechanical Applications.

★ ★ ★

Other B&W Products

THE BABCOCK & WILCOX CO.

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Stationary and Marine Boilers . . . Boiler Components . . . Pulverizers . . . Fuel Burning Equipment . . . Refractories . . . Chemical Recovery Units . . . Process Equipment . . . Alloy Castings.

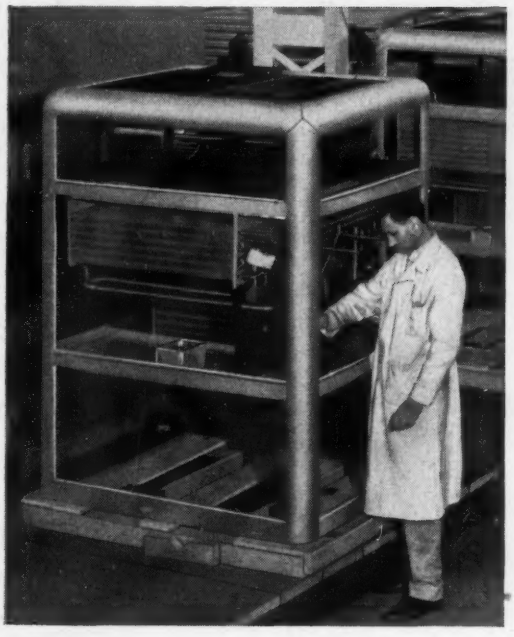
BABCOCK & WILCOX SEAMLESS & WELDED TUBES

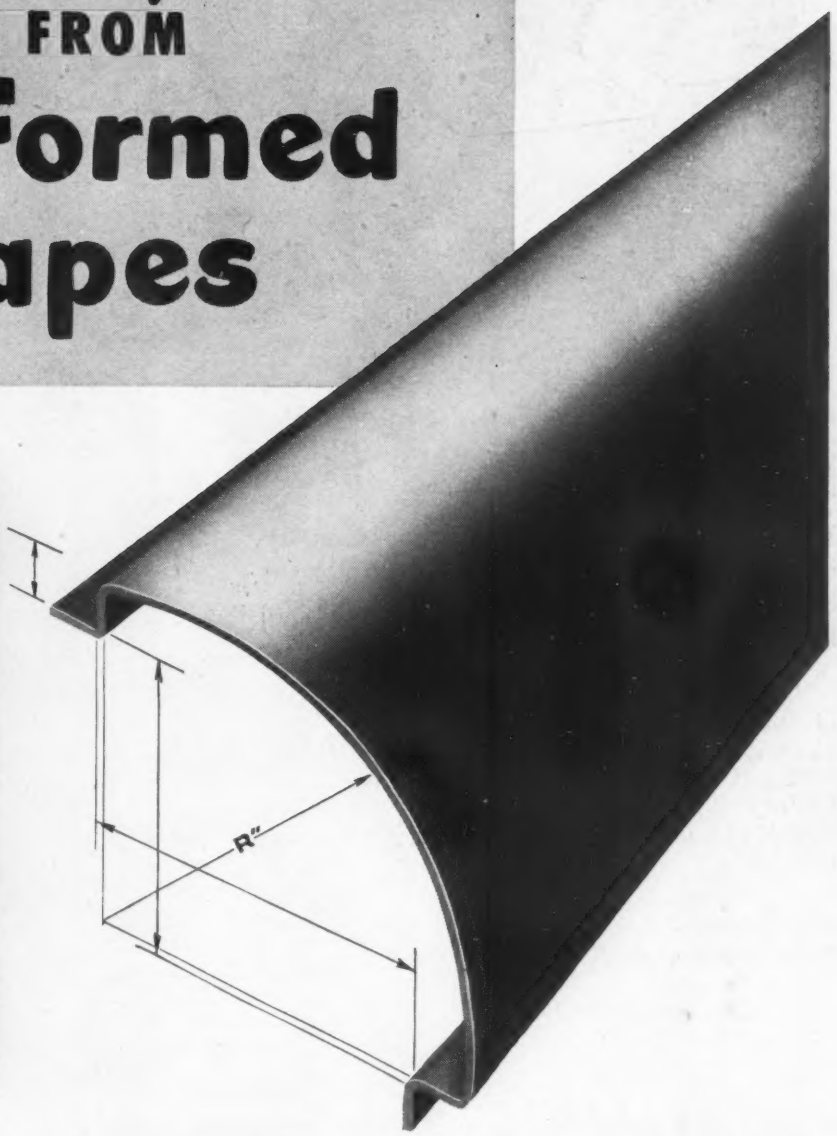
THE BABCOCK & WILCOX TUBE COMPANY

GENERAL OFFICES: BEAVER FALLS, PA.

PLANTS: BEAVER FALLS, PA. AND ALLIANCE, OHIO.

SECTIONS FOR *Air-Conditioning Unit* MADE FROM Cold-Formed Shapes





Of 14-gauge steel, this sturdy cold-formed shape is supplied to the manufacturer in 13 ft lengths. Cut to size and welded, it is used for the corner and top sections of air-conditioning units.

Bethlehem Cold-Formed Shapes are daily proving their convenience and economy as they serve scores of manufacturers in widely diversified applications — as furnace bands, bearing channels, window-frame sections, parts for conveyor systems—to name only a random few.

These shapes are made on presses, brakes or rolls from steel sheets, strip or plates. They are uniform in thickness, and have excellent surface. Can be made to practically any specification, in gauges from 7 to 24, inclusive.

Ask for a copy of our illustrated booklet, "Here's What Bethlehem Cold-Formed Shapes Can Do for You." Contact the nearest Bethlehem district office, or address your request to us at Bethlehem, Pa.

★ BETHLEHEM STEEL ★

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
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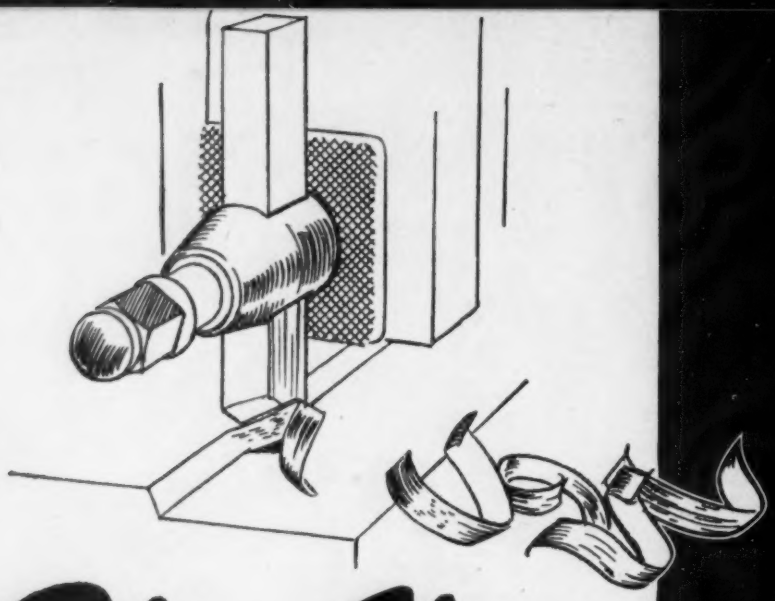
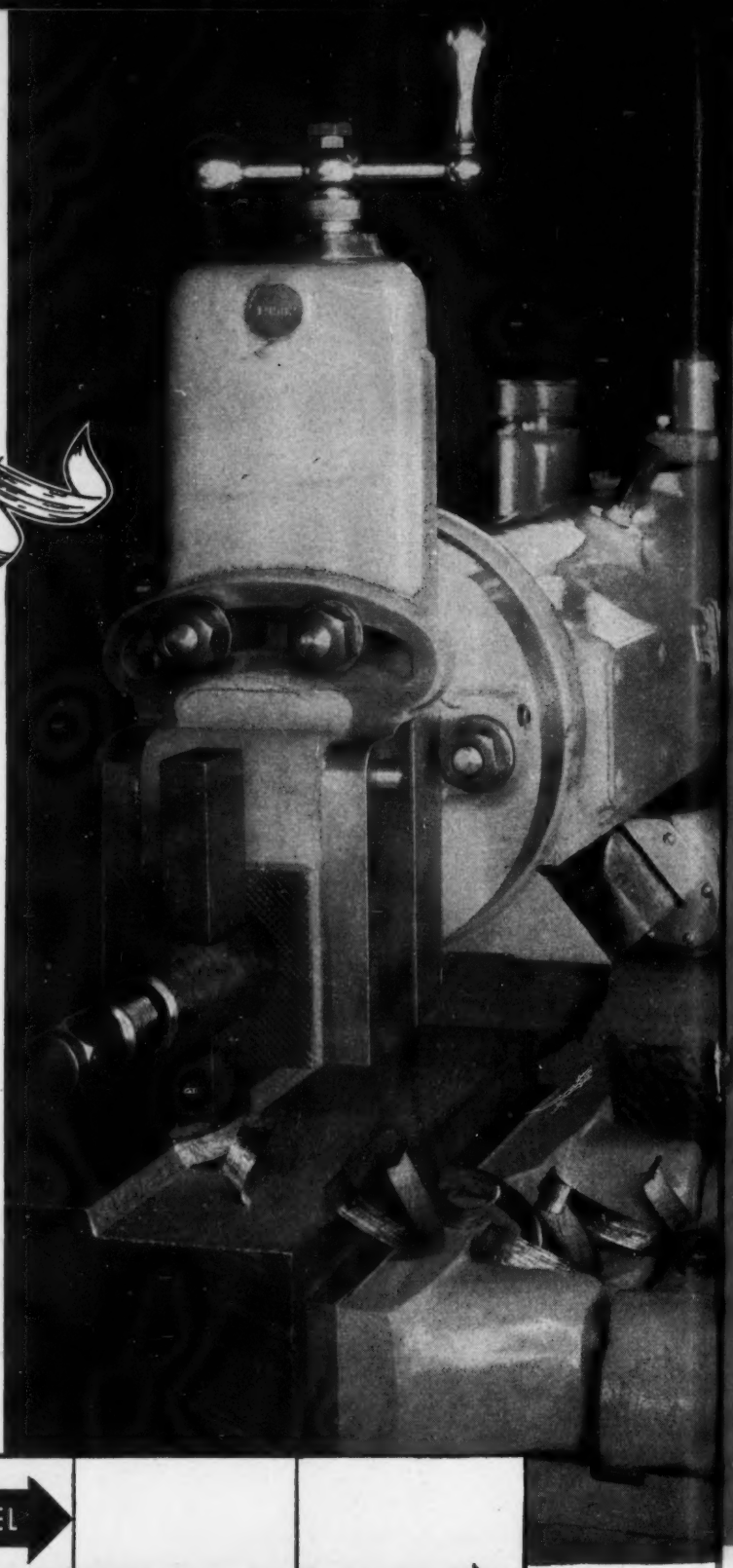




Blue Chips

Cincinnati Shapers cut blue chips that are profitable chips. Blue chips come from tough die steels that present unusually tough machining problems.

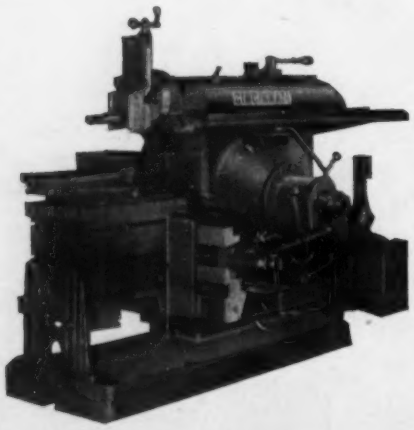
The machine must be accurate in performance, must deliver unusual power at the cutting tool, and must have great stamina. On these things hinges the profitable handling of these tough steels.

Cincinnati Shapers, with their outstanding performance, are found in large numbers in tool and die plants everywhere.

Our representative in your neighborhood will gladly consult with you on increasing accuracy and profit in your shop.

Our Engineering Department is at your service. Ask their advice on your shaping problems.

Write for Catalog N-3



• **THREE TIMES AS TOUGH . . .**
By test, die steels are often three times as tough as mild steel—and machining demands are correspondingly more severe.

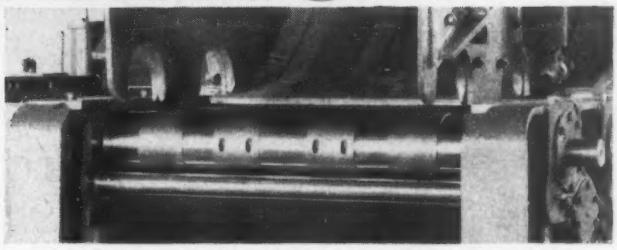
THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

McKAY

STANDARD
UPCOILERS



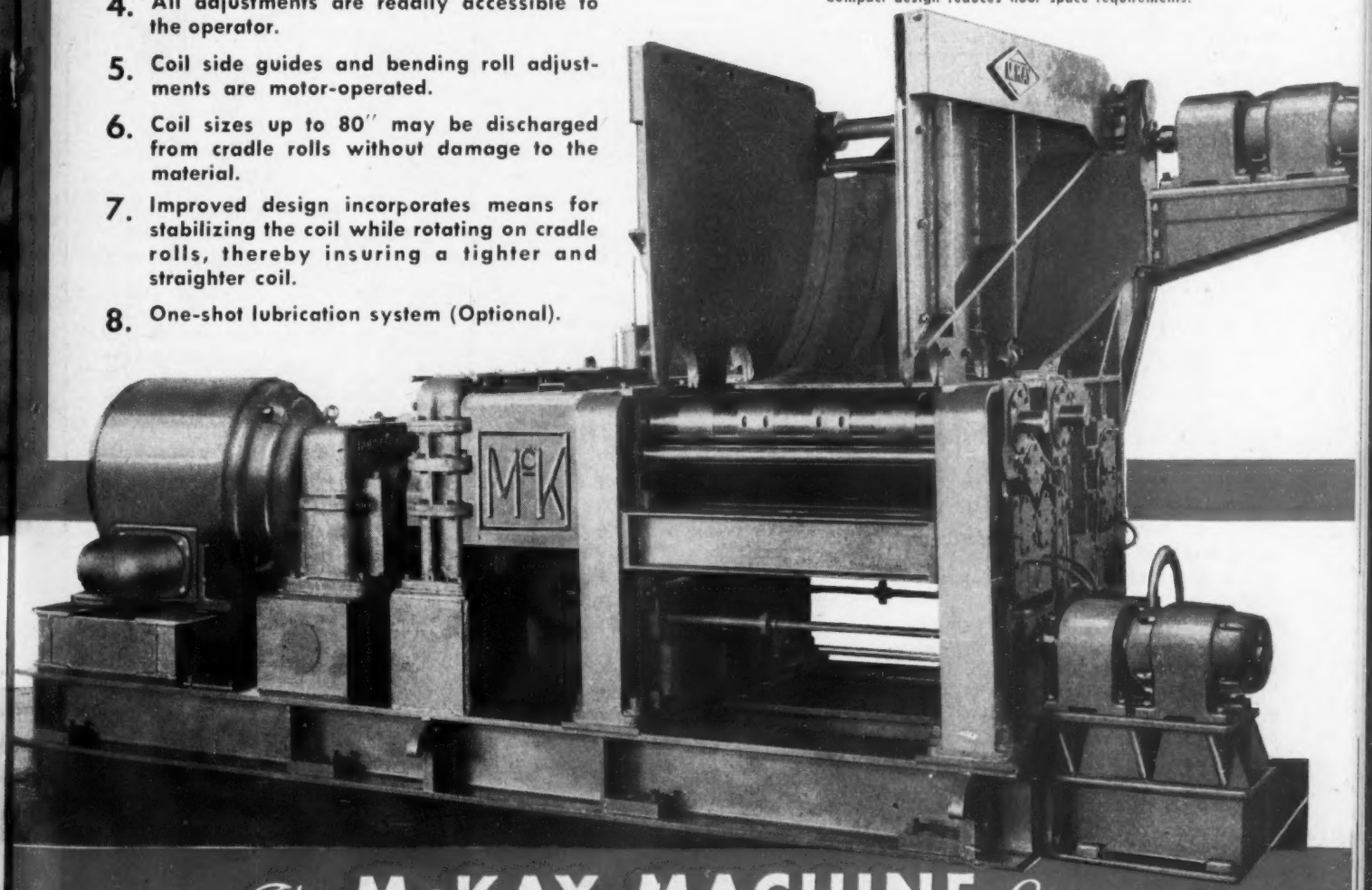
Designed and built with capacity to coil hot or cold strip in various thicknesses and in widths from 24" to 96".

Rugged construction for steel mill service insures continuous performance with minimum maintenance.

Compact design reduces floor space requirements.

Improved features

1. Steel castings or welded steel construction throughout.
2. Roll drive and roll assemblies use anti-friction bearings.
3. All rolls with their assemblies are easily removed thru the outboard housing without further dismantling.
4. All adjustments are readily accessible to the operator.
5. Coil side guides and bending roll adjustments are motor-operated.
6. Coil sizes up to 80" may be discharged from cradle rolls without damage to the material.
7. Improved design incorporates means for stabilizing the coil while rotating on cradle rolls, thereby insuring a tighter and straighter coil.
8. One-shot lubrication system (Optional).



The **McKAY MACHINE** *Company*

ENGINEERS AND MANUFACTURERS OF SHEET, TIN, AND STRIP MILL EQUIPMENT

YOUNGSTOWN, OHIO

ASSOCIATED COMPANY The WEAN ENGINEERING CO., Inc. • WARREN, OHIO

Behind the Scenes...

Huzzas for Homestead

Brother Snell of our Pittsburgh office notes that Homestead Valve Co. has joined the ranks of progressive companies providing a folder giving helpful data for salesmen making calls at their offices in Coraopolis, Pa. The folder gives information on the company's products, names and titles of personnel, location of washroom and parking facilities and contains an invitation to lunch in the company cafeteria. One of the features most to our liking is a 5-paragraph summary of the reasons why they are happy to see and hear all salesmen. Our congratulations to Elliott Johnson, Assistant General Sales Manager of the company for his efforts in producing this fine job.

Machine Tool Show Reflections

Our heads (oh yes, we have two of them) are still spinning from that whooper dooper, super colossal, gigantic Machine Tool Show. We were there for the first week and came away in a daze which we still can't shake. You already have read many of the details of the show as reported by STEEL'S editors who covered the exhibition and the meetings like a tent, and you can look forward to a lot more technical reports in coming issues. But despite all that well-trained editors can do to bring you a word picture of what went on out in Chicago, one almost had to see it to believe it. We faithfully tried to cover one aisle a day of the 1500 foot hall and are ashamed to admit there was one left which we just couldn't make. We might have, if it hadn't been for hanging around our own booth to help greet our good friends and readers who stopped by to comment on the job STEEL is doing these days and to relax and rest their weary dogs. We met and talked with executives, production men and engineers from coast to coast and with readers of STEEL from all over the world. A princely Hindu with a turban and all the trappings came by to request the current issue, and incidentally some of our fancy new matches. The head of a Swiss watch company told us something about the town where our grandfather came from, and we stretched our one-year of freshman Spanish for all it was worth trying to carry on a very unsuccessful conversation with a good subscriber from Mexico City. But there was a chap who spent most of one afternoon in a comfortable corner of our booth who best typified the drawing power of this tremendous show. This was his first visit to the United States and somewhere in the plant he had lost his companion and after a futile search rather smartly decided to sit and wait for him to come by, which he did after three hours. In the meanwhile we discovered he was the managing director of a metalworking plant in Johannesburg, South Africa which employed just fifty people. Having read of the Machine Tool Show in STEEL and the other papers he gets, he decided to fly the 10,000 miles and take it in. He was still full of awe after two days in New York and out on his feet from three days at the show. "But, you know," he said, "I don't see how we can possibly use these marvelous new machines you have here. With just two or three I've seen, my little plant would turn out a month's production in just one day, and that wouldn't do." What could we do with them for the rest of the time?" We didn't have a chance to try to answer because just then his friend arrived and with a wave of his hand they moved out into the aisle and disappeared into the crowd.

Puzzle Corner

The lack of answers thus far to the cow-and-grass problem indicates a need among our readers for instruction along agricultural lines. According to our little book, the answer is 88 cows required to eat the grass on 40 acres for six weeks. The book further states that Sir Isaac Newton figured out the answer first, by dividing the cattle into two groups—one to eat the accumulated grass and the other to eat the increase. The latter varies directly with the size of the field and inversely with the time. The former varies directly with the acreage and doesn't have anything to do with the time. We figure that must have come shortly after he was hit on the head by the apple! Here's a simple one for a breather—arrange three nines so that they represent (a) less than 1: (b) less than 10; (c) more than 900; (d) exactly 10; (e) exactly 11; (f) exactly 20.

Shrdlu

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STEEL

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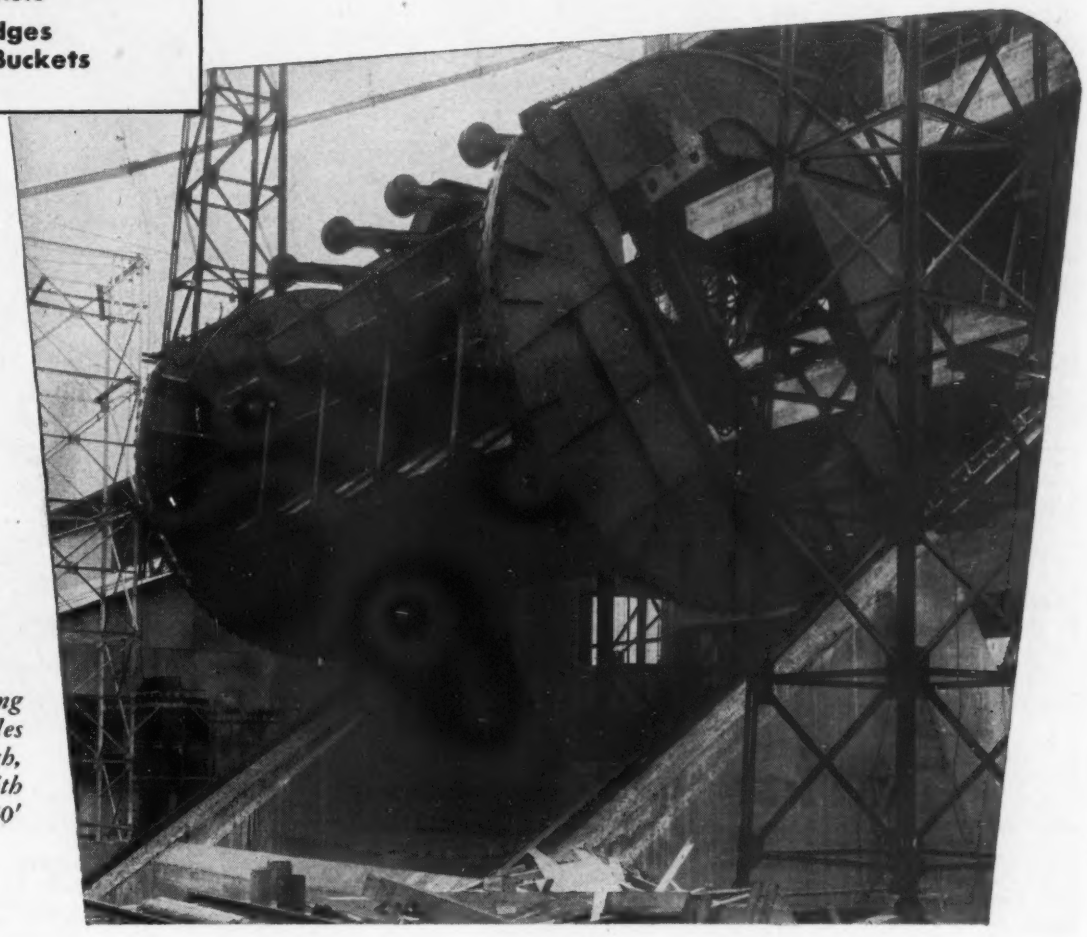
WELLMAN Rolling Car Dumper

Loads at Ground Level



This Wellman Rolling Car Dumper handles cars 7′ to 12½′ high, 9′ to 10½′ wide, with overall lengths of 50′ inside the cars.

● Wellman built this Rolling Dumper so cars could be unloaded without providing the usual lower-level storage bins. The Dumper receives the loaded car at ground level. Then it is rolled into the dumping position on runways inclined at 35° angles. The Dumper will handle open top railway cars with a loaded weight of car and contents of 220,000 pounds at the rate of 20 cars per hour.

This specialized installation is typical of the Wellman engineering skill that can be applied to your installation.

THE WELLMAN ENGINEERING COMPANY

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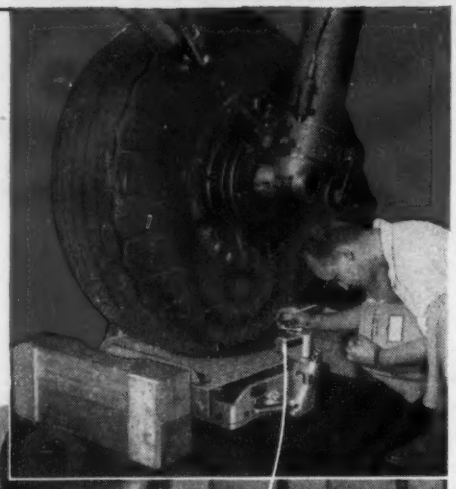
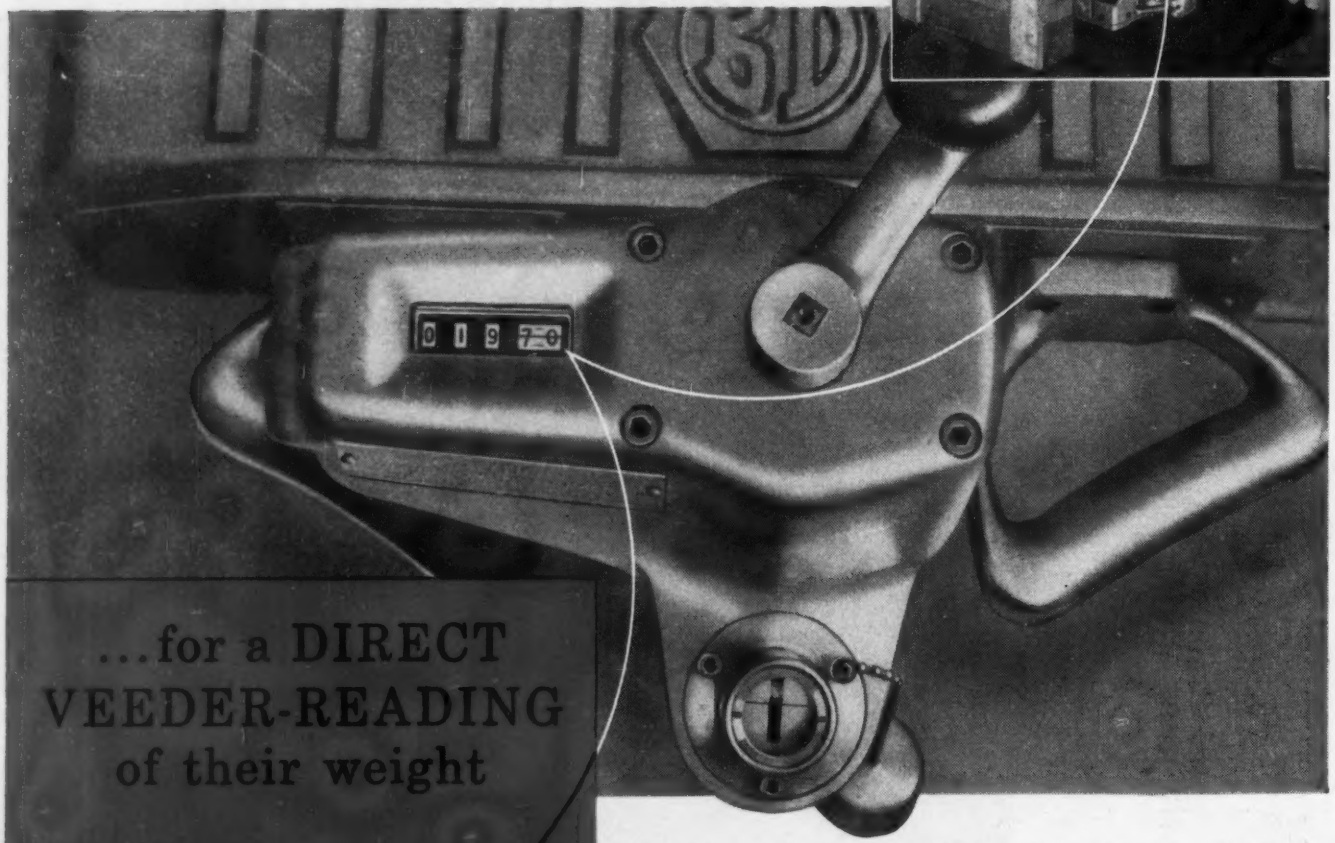
Now...Aircraft "Step Right Onto the Scales"...





...for a DIRECT VEEDER-READING of their weight

VEEDER-ROOT RESET COUNTER, built into the Aircraft Loadometer made by The Black & Decker Mfg. Co., Towson, Md., approved by U. S. Bureau of Standards, Dept. of Commerce, and Civil Aeronautics Authority.

To determine the weight and balance of any aircraft . . . tiny flying boat or giant transport . . . *here's all there is to do:*

Run each plane wheel up the ramp and onto the platform of the convenient portable Aircraft Loadometer. As simply as that, this accurate Black & Decker device gives an instant reading of the plane's weight.

In the Loadometer, the system of weighing levers is pivoted to a calibrated spring. This spring is extended by a micrometer screw geared to a Veeder-Root Reset Counter which gives an instant and *direct* Veeder-Reading of the plane's weight in pounds or kilograms.

In selecting a counting device for the Aircraft Loadometer, Black & Decker chose this Veeder-Root Reset Counter because it provides a *positive* reading, because the reading *remains* after the load is removed from the platform, and because the device is easily *reset* to balance at zero after each weighing. The Veeder-Root counter also provides an accurate minimum reading of five pounds and upward to the maximum capacity of 20,000 pounds.

Here again is proof that Veeder-Root not only "Counts Everything on Earth"—but also many things that fly above it. And standard or special Veeder-Root Devices, built into *your* product, can count to your advantage in more ways than you could ever figure out, alone. So talk it over with a Counting House engineer. Just write and say when you want him to call.

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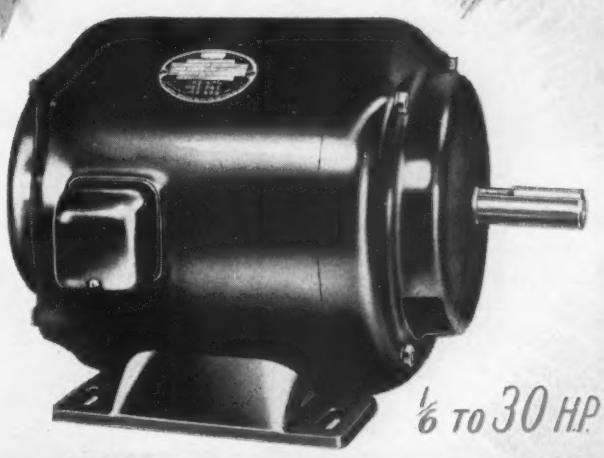
"TRULY LIFE-TIME MOTORS"

B-LINE

Superlative Horse Power



1/6 TO 30 H.P.

Inquiry is invited from manufacturers of motor-driven equipment or quantity users of Motors and Gearmotors . . . Added plant facilities enable us to offer advantages in service and delivery to those interested in quality products. Wire or write for Bulletin No. 5000.

THE BROWN-BROCKMEYER COMPANY

PLANTS AT DAYTON, WILMINGTON, WASHINGTON AND XENIA, OHIO

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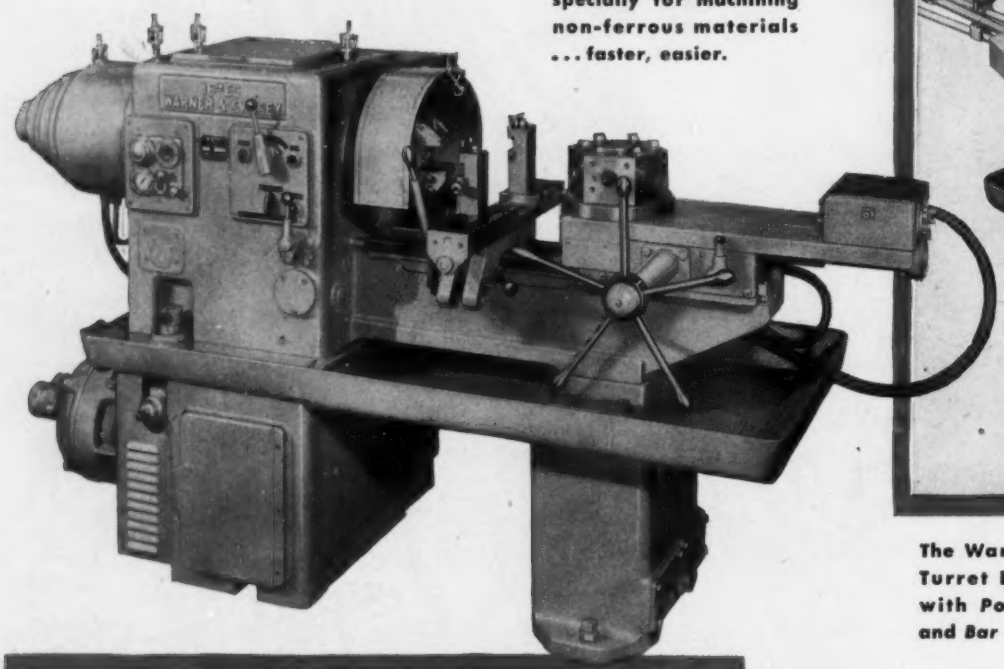
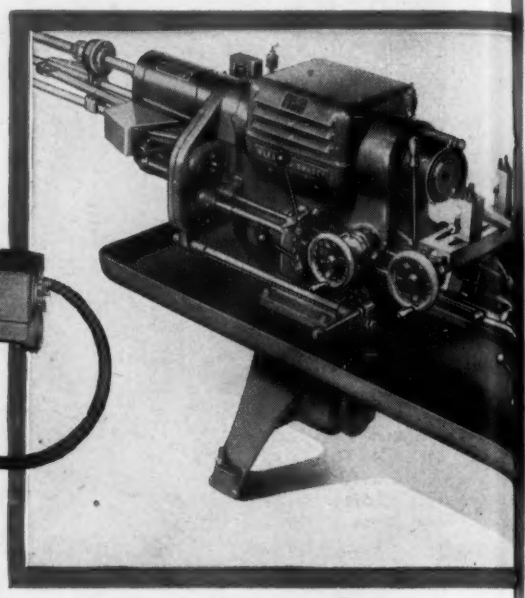
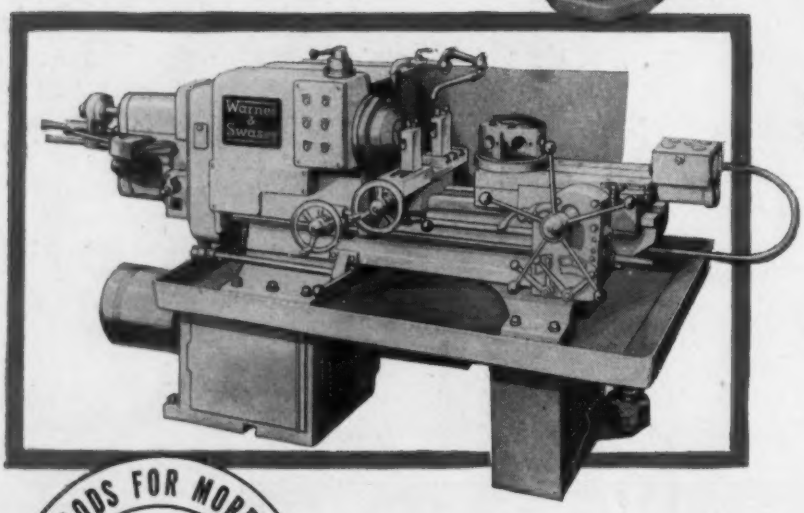
JOBS WANTED!

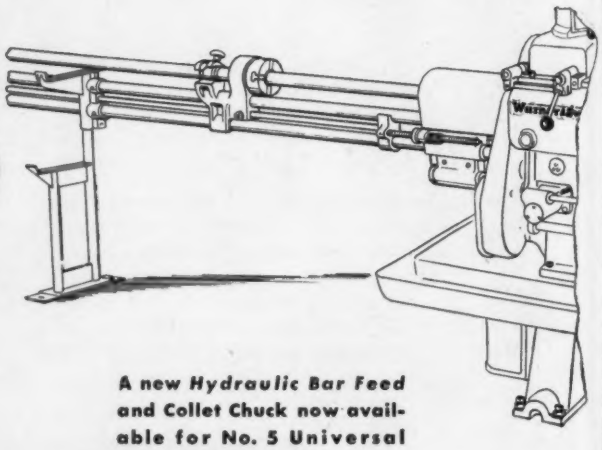
The new **ELECTRO-CYCLE** Turret Lathe developed specially for machining non-ferrous materials ... faster, easier.





The Warner & Swasey No. 1 Electric Turret Lathe can now be furnished with *Power Automatic Collet Chuck* and *Bar Feed* as standard equipment.





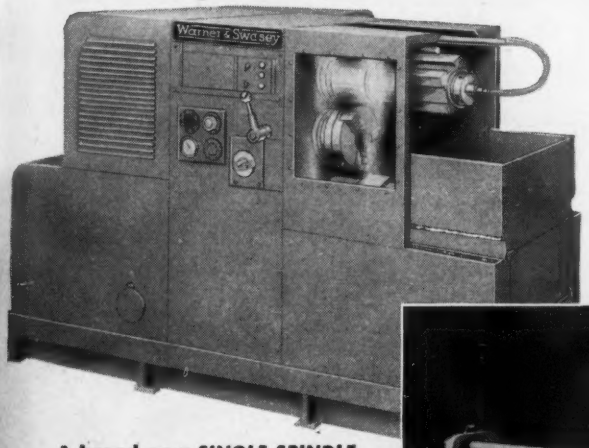
A new *Hydraulic Bar Feed* and Collet Chuck now available for No. 5 Universal Turret Lathe; takes only 1/20 the effort needed for manually operated units.

MORE GOODS FOR MORE PEOPLE AT LOWER COST

Now for the first time *"Electro-Cycle" Type Control* is adapted to Warner & Swasey Turret Lathes for faster turning of "hard metals".

YOU CAN MACHINE IT BETTER, FASTER,

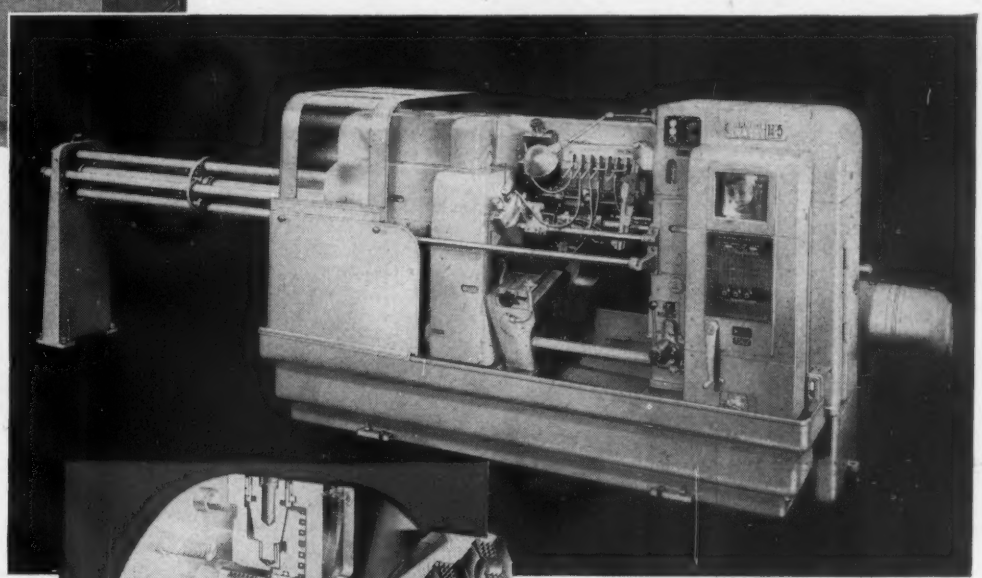
STAR PERFORMERS INTRODUCED AT THE 1947 MACHINE TOOL SHOW NOW WANT STEADY WORK

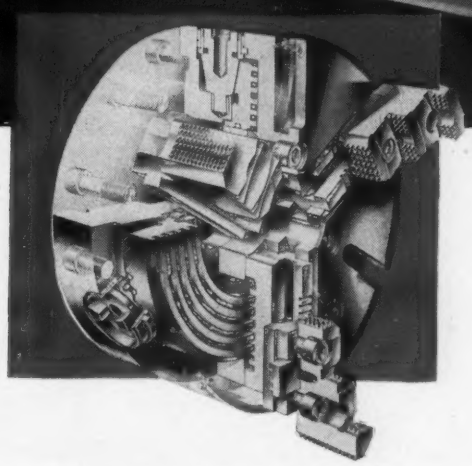


The machines shown are some of the new Warner & Swasey developments demonstrated at the Machine Tool Show. They offer alert production men specific ways to increase production and reduce manufacturing costs.

For further information, call in your Warner & Swasey field man or write Warner & Swasey, Cleveland, Ohio.

A brand new *SINGLE SPINDLE AUTOMATIC CHUCKING* Machine offers a new concept of rigidity, ease of set-up and cross slide selectivity.





NEW FIVE-SPINDLE AUTOMATICS, BAR and CHUCKING TYPES eliminate cam changes...make automatic operation practical and profitable on small lots as well as on long runs.

Newly designed PRECISION TAPPING and THREADING MACHINES featuring exclusive LEAD SCREW PRINCIPLE and SOLENOID ACTUATED GUIDE FINGERS.

An entirely new line of EXTRA HEAVY-DUTY SCROLL CHUCKS for greater, safer gripping power. Sizes 8″ to 24″. Adaptable to nearly all models of lathes having type A1 American standard flange spindle nose.

Turret Lathes
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Precision Tapping and Threading Machines

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FOR LESS . . . WITH A WARNER & SWASEY

GIANT SIZE DISHED HEADS

Accurately Spun at Low Cost

ON BIRDSBORO FLANGE SPINNING MACHINES

When you have an "out-size" dishing job, look to Birdsboro Flange Spinning Machines to give you close tolerances and low cost as well as speedy operation. The machine shown is flexible in control and capacity, has a clearance of 17' between columns and forms flanged and dished heads from plates ¾" to 4" thick.

Designing and building such special purpose machinery is an everyday function here at Birdsboro. Our engineering staff is ready at all times to cooperate in applying their specialized knowledge to give you a practical solution to your heavy equipment problems.

BIRDSBORO STEEL FOUNDRY & MACHINE COMPANY • BIRDSBORO, PENNSYLVANIA

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BIRDSBORO

STEEL MILL EQUIPMENT

Another LIQUID ENVELOPE Application

Lustrous FINISHED PRODUCTS

DIRECTLY FROM
PRE-FINISHED NICKELOID METALS
WITH MINIMUM SCRAP-LOSS!

Now—*pre-finished* NICKELOID METALS can be worked as casually and *more economically* than cold-rolled-plus-plating . . . thanks to a protective coating of peelable "LIQUID ENVELOPE".

Coated with this remarkably tough "peelable plastic film of protection", NICKELOID METAL arrives on your production line with its mirror-like surface unblemished . . . can then undergo any stamping, bending or fabricating operation . . . emerge as a finished piece ready for assembly with its pristine beauty intact.

Whether you use pre-finished sheet, polished stainless, aluminum, magnesium, Monel or cold rolled, you'll save time and cost by insisting upon "LIQUID ENVELOPE" protection of work-in-process. Film as thin as .001-.002" cushion dies; minimizes die dressing; eliminates die marks, brake-bending scars, weld spatter, assembly scratches, etc. Easy to peel off as the skin of a banana!

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For detailed data on pre-finished NICKELOID METALS in Nickel, Chrome, Copper, Brass and Gold — Mirror, Satin and Bright Finishes . . . on Sheets, Coils, Strips and Round-Edge Flat Wire, address American Nickeloid Company, Peru 8, Ill.

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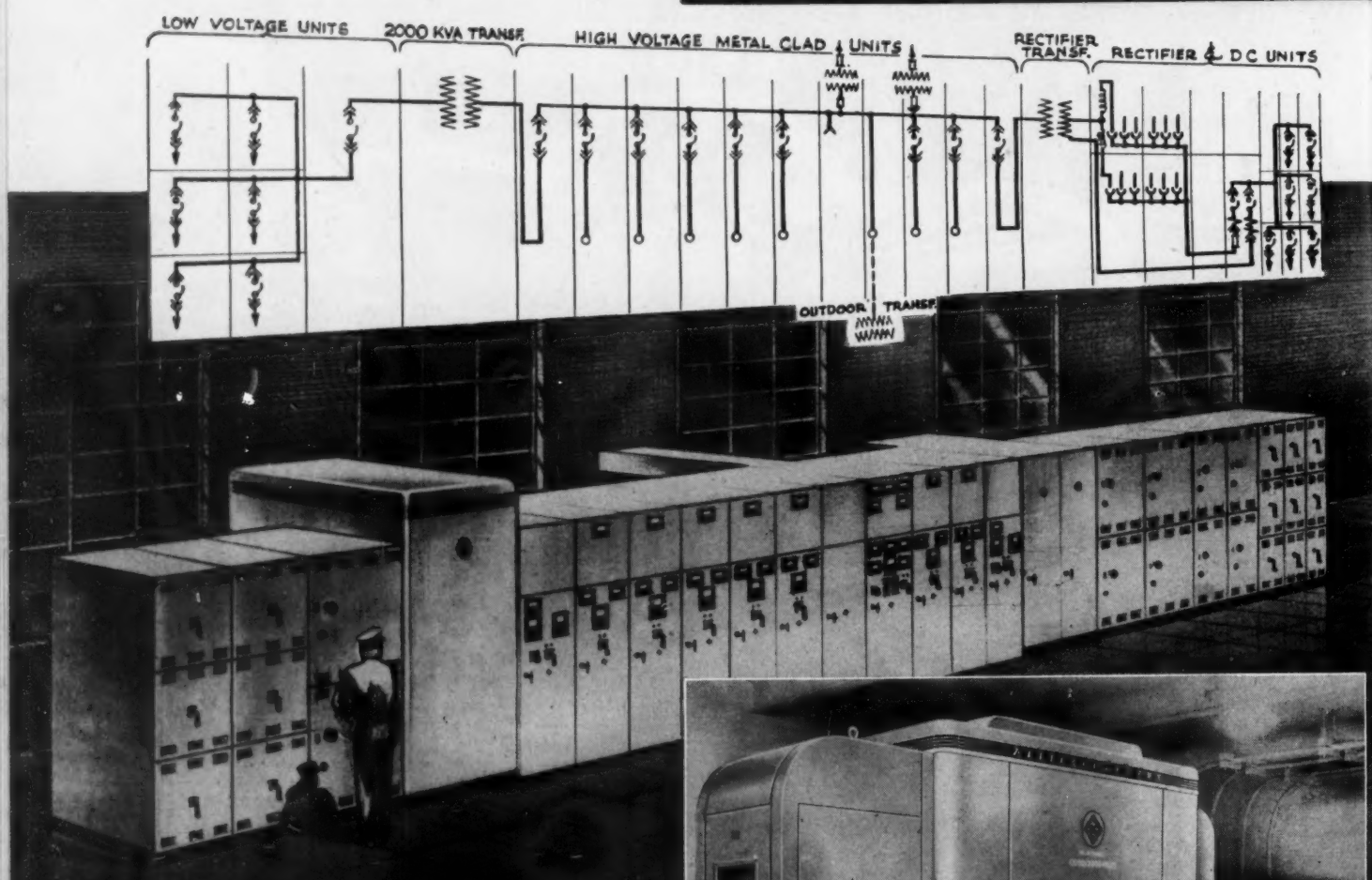
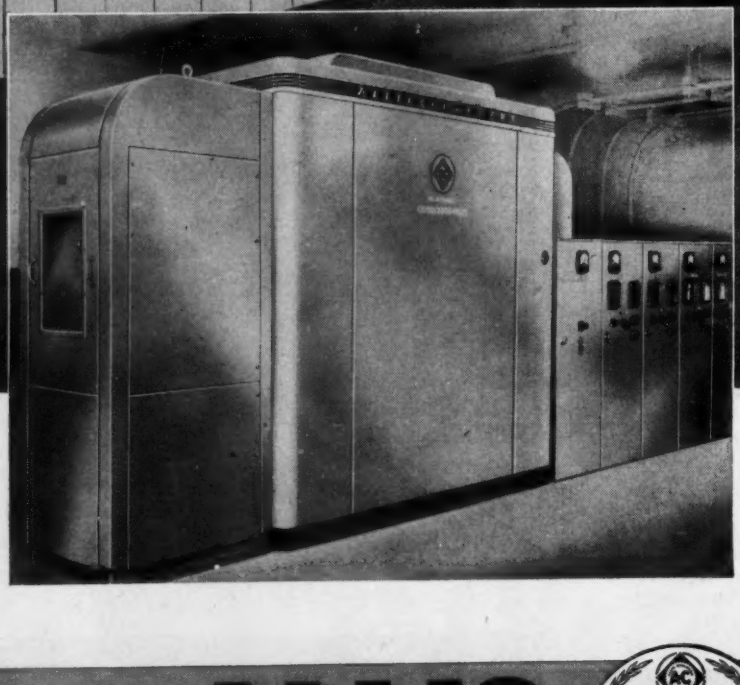
LOAD CENTER LOWER



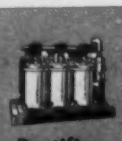
BOTH A-C AND D-C POWER are supplied by this multi-circuit unit substation. It uses an A-C dry-type transformer, switchgear with *Ruptair* magnetic air circuit breakers, and an *Excitron* rectifier.



TYPE MCS MULTI-CIRCUIT UNIT SUBSTATION. Consists of two or more vertical-lift metal-clad switchgear units throat-connected to a power transformer. Size is limited only by switchgear—500,000 kva maximum interrupting capacity. Either outdoor or indoor design is used depending on load and space requirements. It may be installed centrally to supply its rated load or to feed other smaller substations at selected load centers.

Transformers

Switchgear and Switchboards


Rectifiers

Motors for Mill Drives

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POWER... COST STEEL!

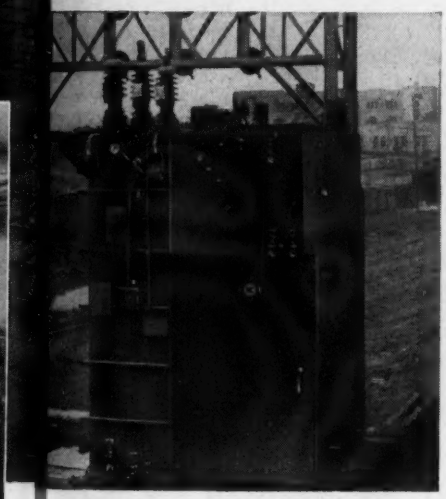
Load Center Mill Power Distribution with Allis-Chalmers Unit Substations Saves Money . . . Has Expansion Flexibility . . . Improves Voltage Regulation and Cuts Line Losses!

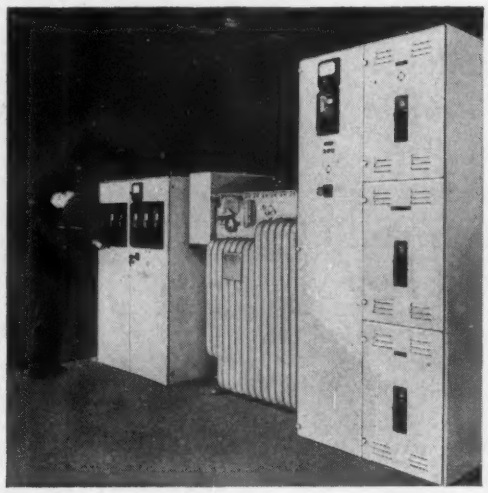
IRON AND STEEL PRODUCERS can cut production costs by using the load center system of power distribution with Allis-Chalmers modern unit substations. These space-saving units bring *rated* voltages to plant equipment for *increased efficiency, lowered maintenance costs,* and *less outage time.* Easily maintained and installed, unit substations cut cost and size of copper. They provide *flexibility* of power distribution . . . expansion or relocation is no problem.

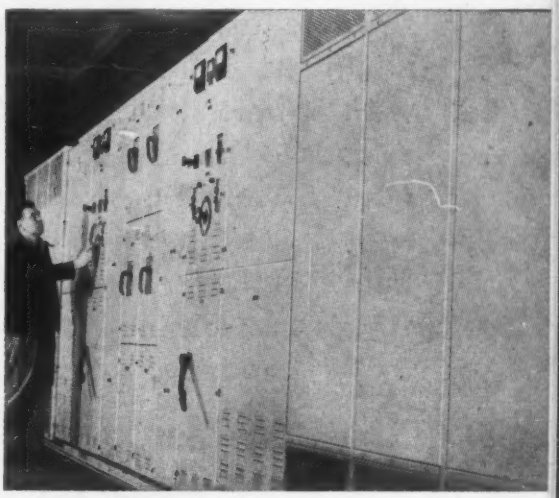
Metal enclosed throughout, they assure *maximum* safety for personnel, both during daily plant activity and during inspection or maintenance operations.

Load requirements determine which of the four types to use . . . or the best combination for overall mill power distribution. They can be built for indoor or outdoor service . . . with dry-type, oil-filled, or *Chlorextol-liquid-filled power transformers as desired. Standardization of design permits forecasting of space needs and handling operations.

Your nearby A-C office will provide further details, or write ALLIS-CHALMERS, MILWAUKEE 1, WIS.







TYPE SCS SINGLE-CIRCUIT UNIT SUBSTATION has power transformer and control equipment for a single feeder supply in a compact unit housing. It can be used as a permanent substation or as a temporary power source for isolated, concentrated loads or loads whose location is shifted at intervals.

TYPE LCS LOAD-CENTER UNIT SUBSTATION provides a 600-volt or lower power source for auxiliary motor and lighting loads. Its compact construction cuts space needs with roof or balcony mounting possible. Lines enter through units ranging from plain junction boxes to metal-clad switchgear. Feeder circuits are controlled by dead-front air circuit breaker switchgear.

D-C LOAD CENTER UNIT SUBSTATION uses a sealed *Excitron* rectifier in conjunction with the normal a-c load center unit substation equipment. The rectifier is factory-assembled and -wired assuring positive operation.

The combination furnishes a highly efficient source of 250-volt d-c power at the load center. It shortens heavy copper runs, simplifies installation, and requires minimum maintenance. A 2282

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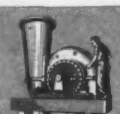
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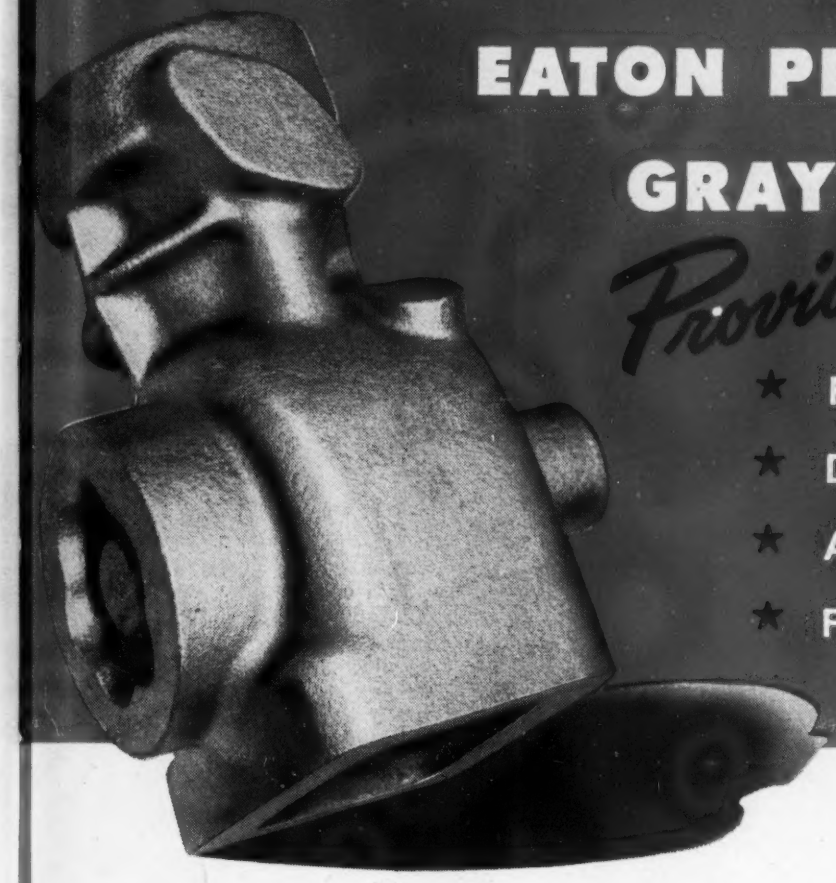
EATON PERMANENT MOLD GRAY IRON CASTINGS *Provide*



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- ★ DENSE NON-POROUS STRUCTURE
- ★ ABILITY TO TAKE MIRROR FINISH
- ★ FREEDOM FROM DISTORTION

EATON Permanent Mold Gray Iron Castings fulfill every desired specification for refrigeration cylinder blocks. The structure of the casting is dense and non-porous, capable of holding liquids and gases under high pressure. Permanent Mold Gray Iron takes a beautiful mirror finish, an ideal characteristic for cylinder walls. Proper annealing insures that the castings will hold size and not distort after machining. Free machinability is a desirable characteristic of all Eaton Permanent Mold Gray Iron Castings.

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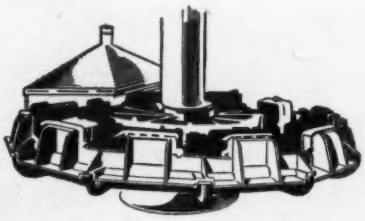
Almost every product has one or more parts which could be made better from Permanent Mold Gray Iron. Eaton Foundry Division engineers will be glad to discuss the application of Permanent Mold Gray Iron Castings to your products.

The illustrated booklet, "The Eaton Permanent Mold Process," tells the complete story of Permanent Mold Gray Iron. Send for your copy.



EATON PERMANENT MOLD MACHINE IS A SYMBOL OF THE QUALITY GRAY IRON CASTINGS PRODUCED BY THE PERMANENT MOLD PROCESS.

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How Fast Can You Clean A Steel Pop Bottle?

Unretouched photograph courtesy Spacarb, Inc.

Used in coin-operated soda dispensers, these carbonating cylinders are made of stainless steel tubing. The darker of the two has been blackened by welding and silver soldering during fabrication.

Cleaning this cylinder, especially the inside, is a tough, tedious job—unless you use a pickling solution. Dozens of solutions were tried, however, without success—etching reaction made the tube surface unacceptable to Health authorities.

At the suggestion of Frasse, another solution was tried —with the result shown in the picture. Entirely satisfactory in surface finish, the tube is now cleaned at a saving of one hour and fifty minutes per unit.

Frasse makes no pickling solutions (although we'll send details for making this one on request)—but if you use tubing, and like qualified engineering service in its application, you'll find Frasse a good source to standardize on. Alloy, stainless and straight carbon inventories in a wide range of sizes and types for every commercial use. Call us.

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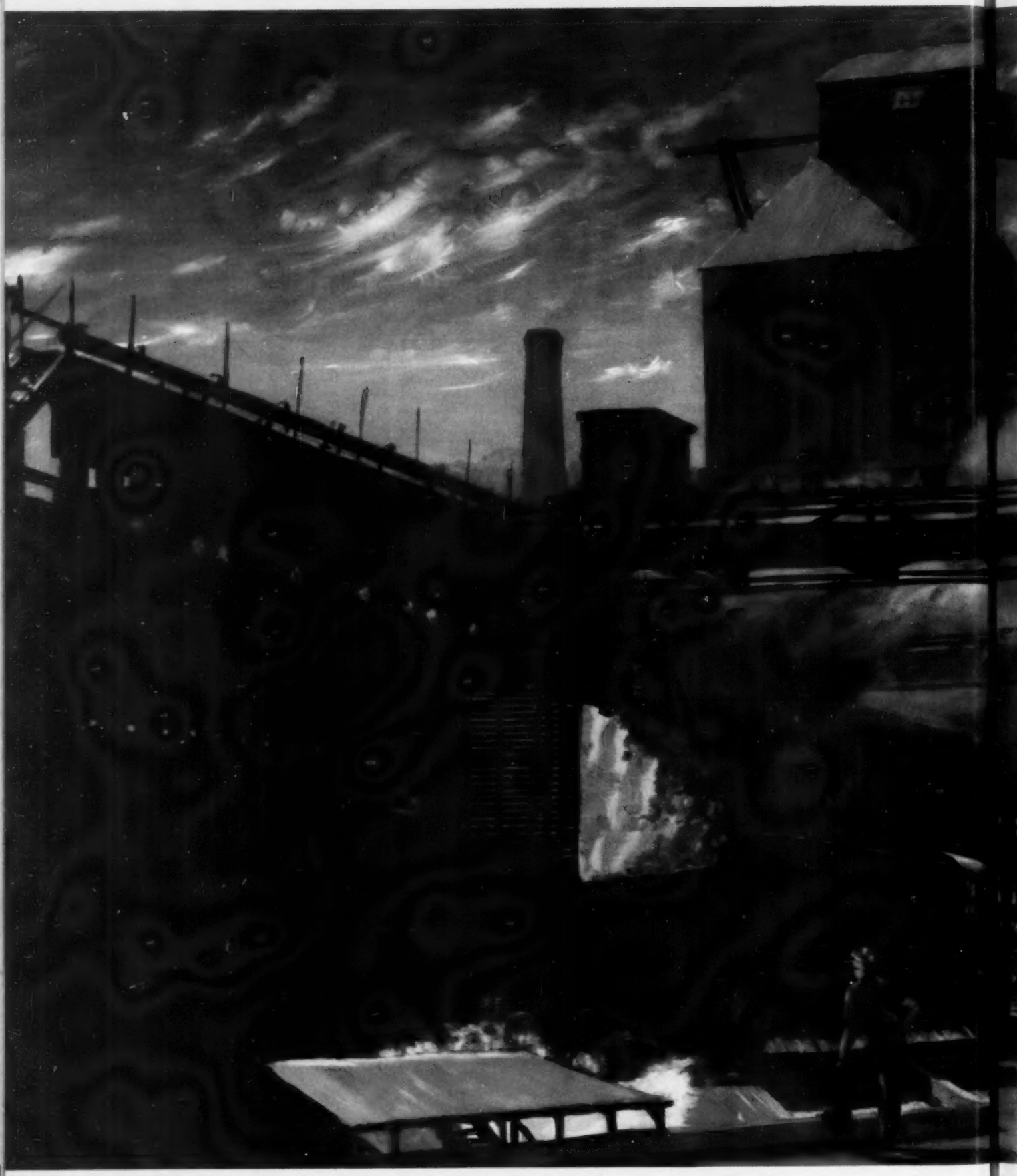

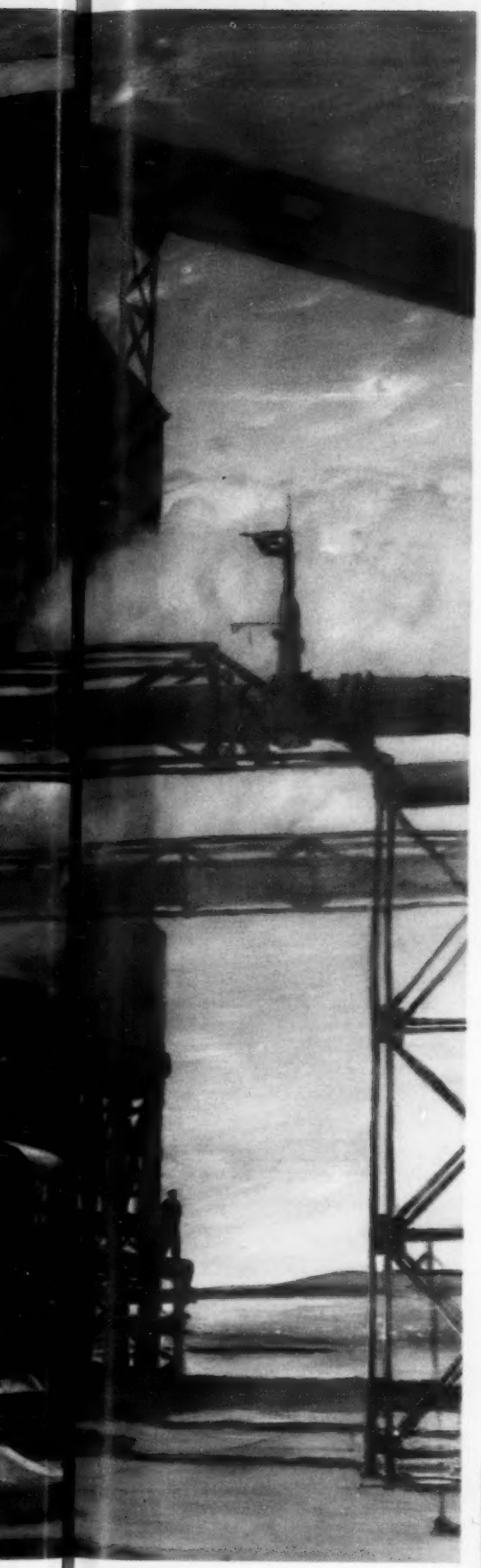

6 reasons

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4. They are built of the best materials available and of sturdiest design; are free from complications; are simple to control, and accessible throughout, insuring low maintenance cost and long life.

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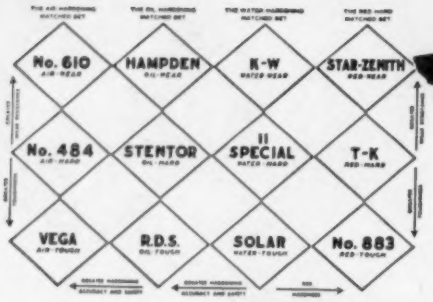
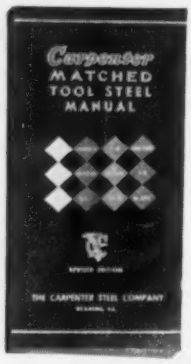


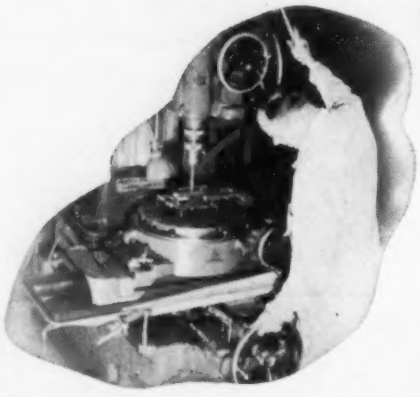
HELP IN TOOL STEEL SELECTION!

The Carpenter Matched Set Method of Tool Steel Selection enables you to quickly choose the right steel for best results on each tooling job. Just by following the arrows on the Matched Set Diagram, you can determine exactly which steel to pick for extra wear resistance, greater toughness, hardening accuracy and safety, etc.



HELP THAT SIMPLIFIES HEAT TREATING!

To further insure your results, complete information on the properties and behavior of each tool steel is yours—along with detailed, easy-to-use heat treating instructions.



HELP TO INCREASE TOOL LIFE!

If the tools you are using fail prematurely in service, the Carpenter Matched Set Method helps you determine which steel has the right properties for your job—enables you to more quickly arrive at the one steel most likely to boost output per grind and reduce tool failures.

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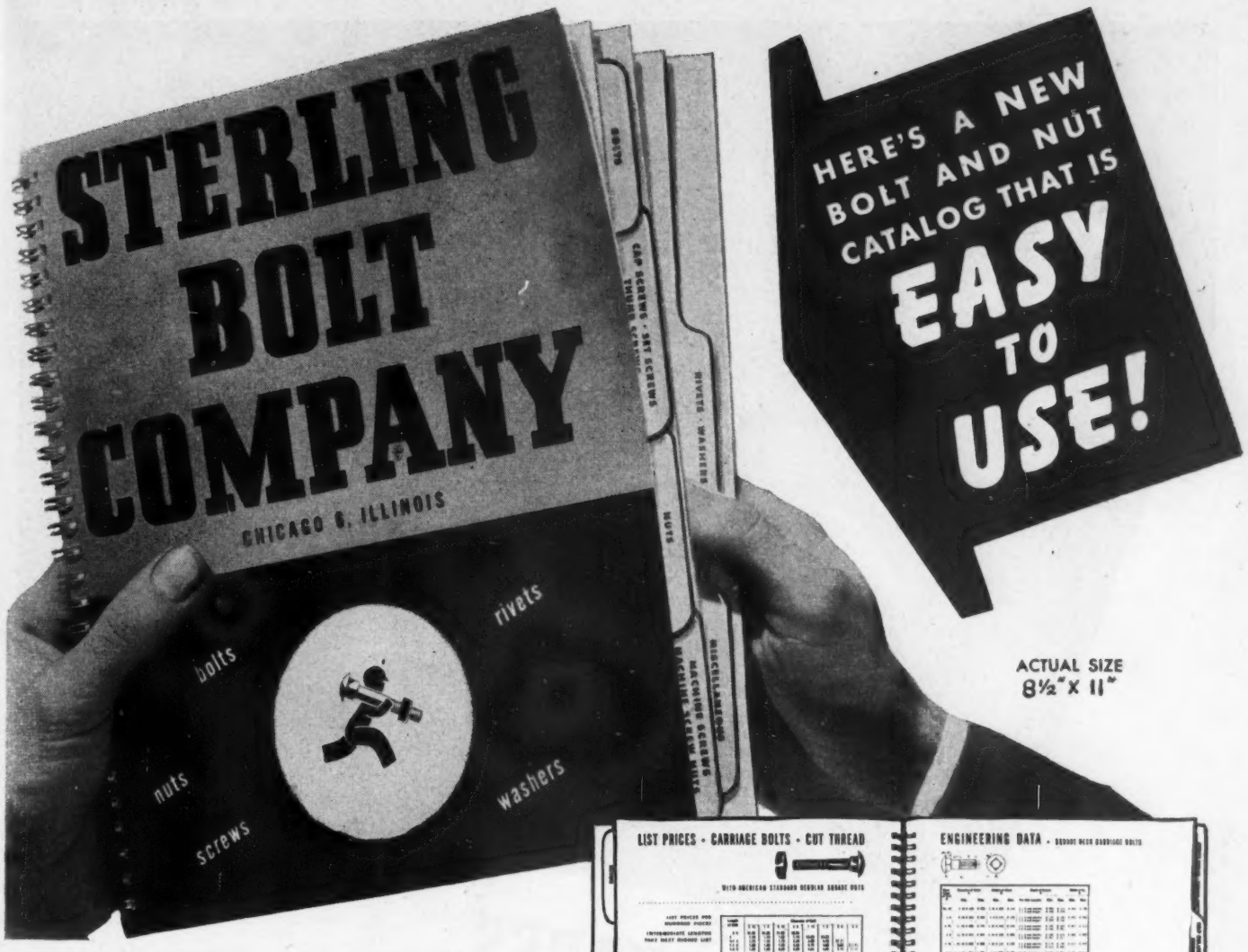
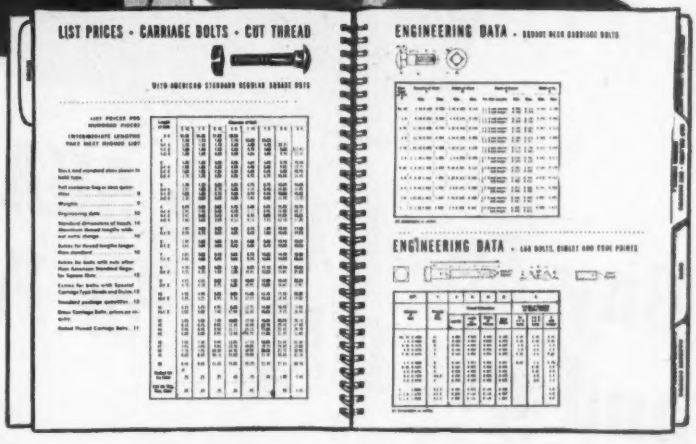
TOOL STEELS





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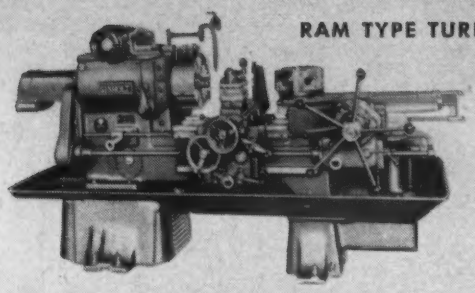
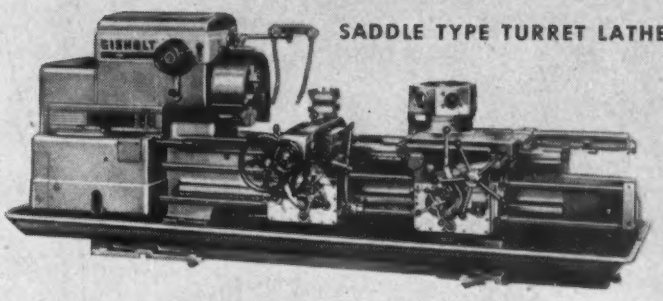
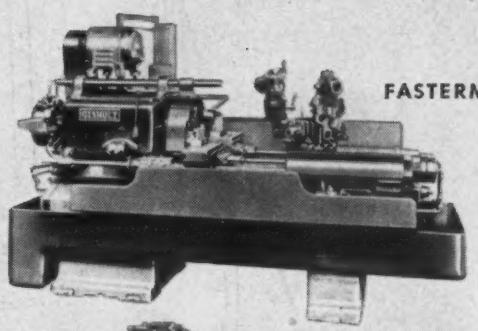


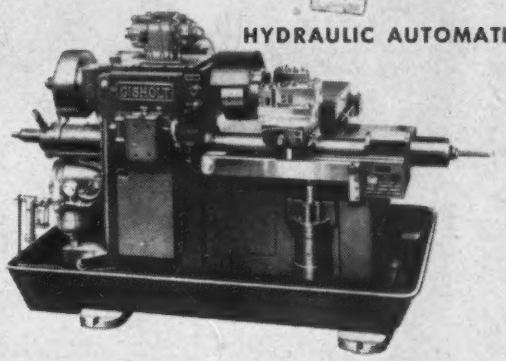
RAM TYPE TURRET LATHES



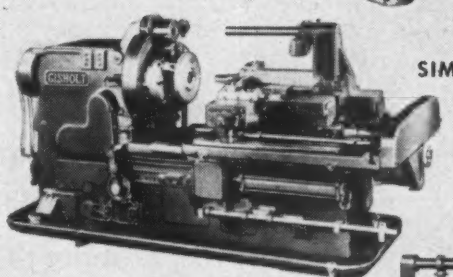
SADDLE TYPE TURRET LATHES



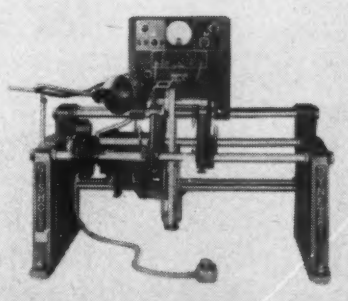
FASTERMATIC



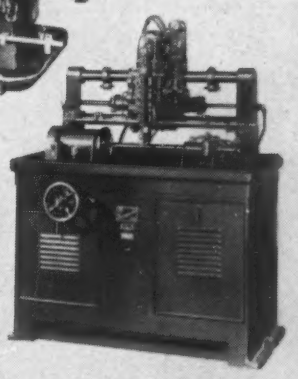
HYDRAULIC AUTOMATIC LATHES



SIMPLIMATIC



BALANCERS



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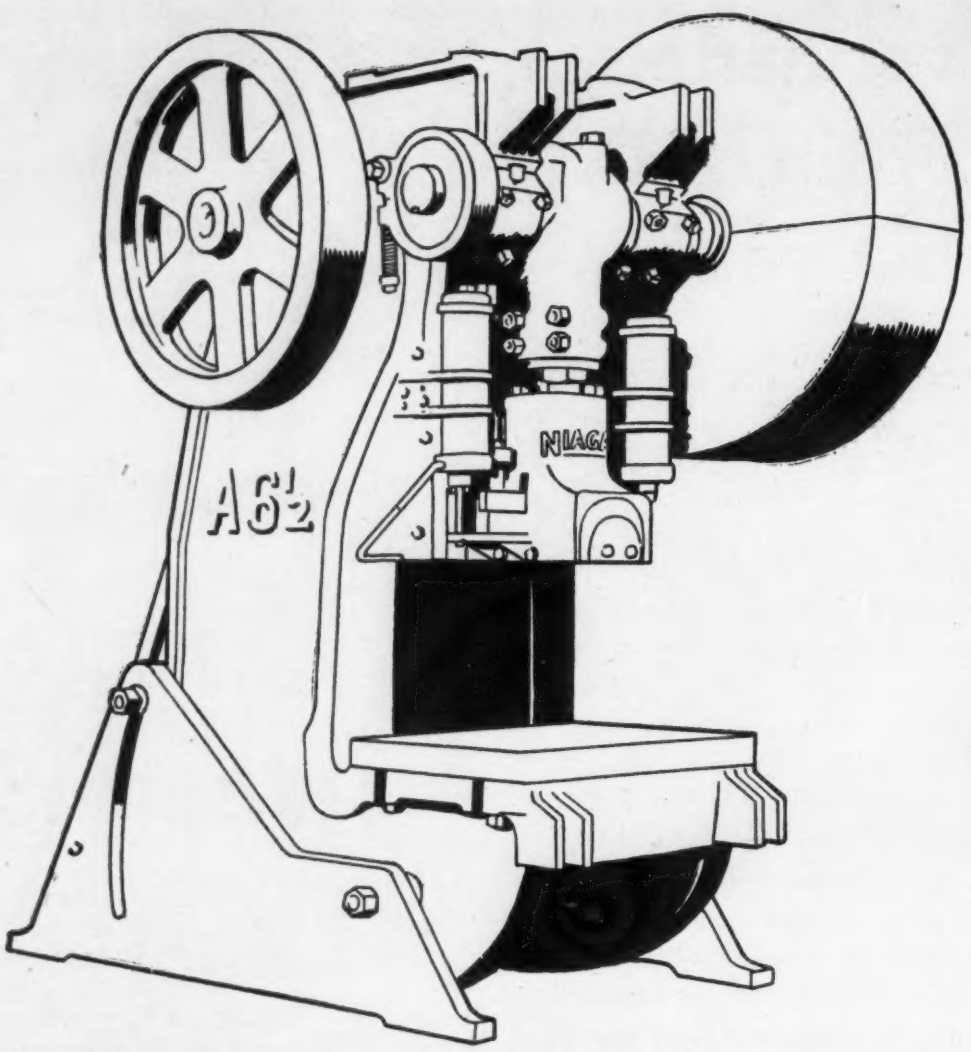

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5. Estimates of Cost Reducing Possibilities which may be obtained through, (1) utilization of greater strength in lighter sectional thicknesses available in forgings, (2) rapid assembly of complex parts by welding forgings, (3) reductions in time required to machine and finish, (4) reductions in rejects due to forgings being unusually free of hidden defects.

6. Technical Facts derived from the accumulated experience (over 34 years) of Steel Improvement Engineers and Metallurgists, which may be useful in determining to what specific extent applications of forgings may contribute to over-all product improvement.

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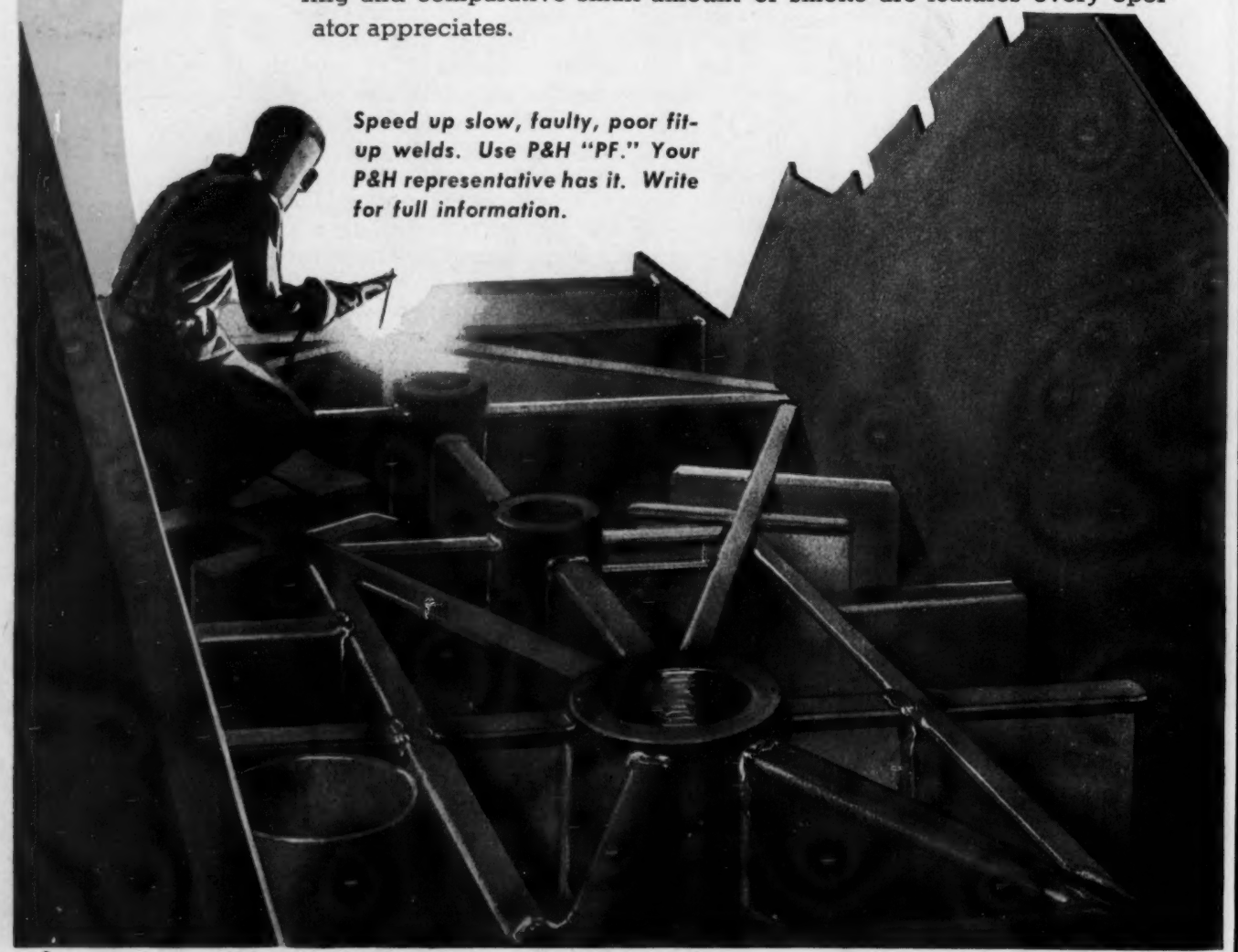

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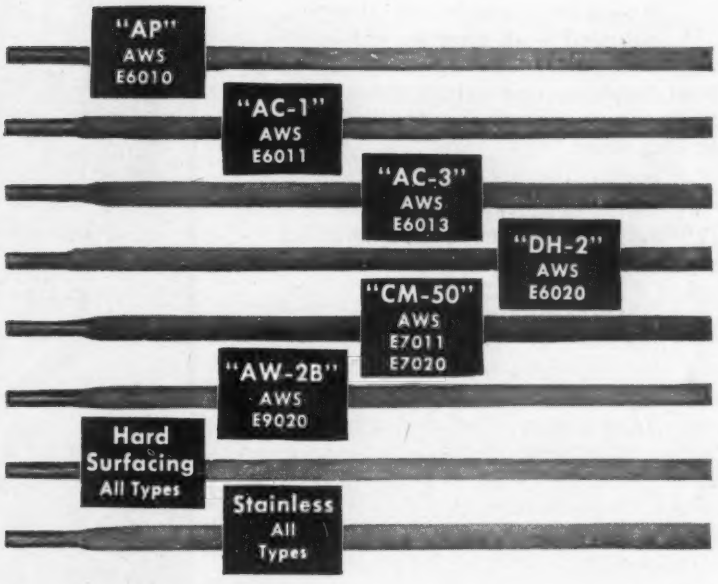

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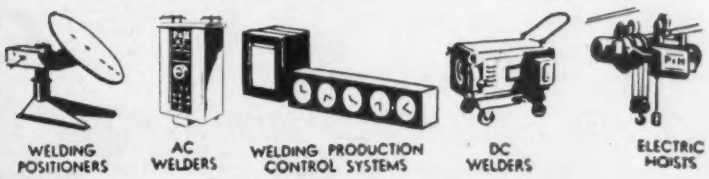

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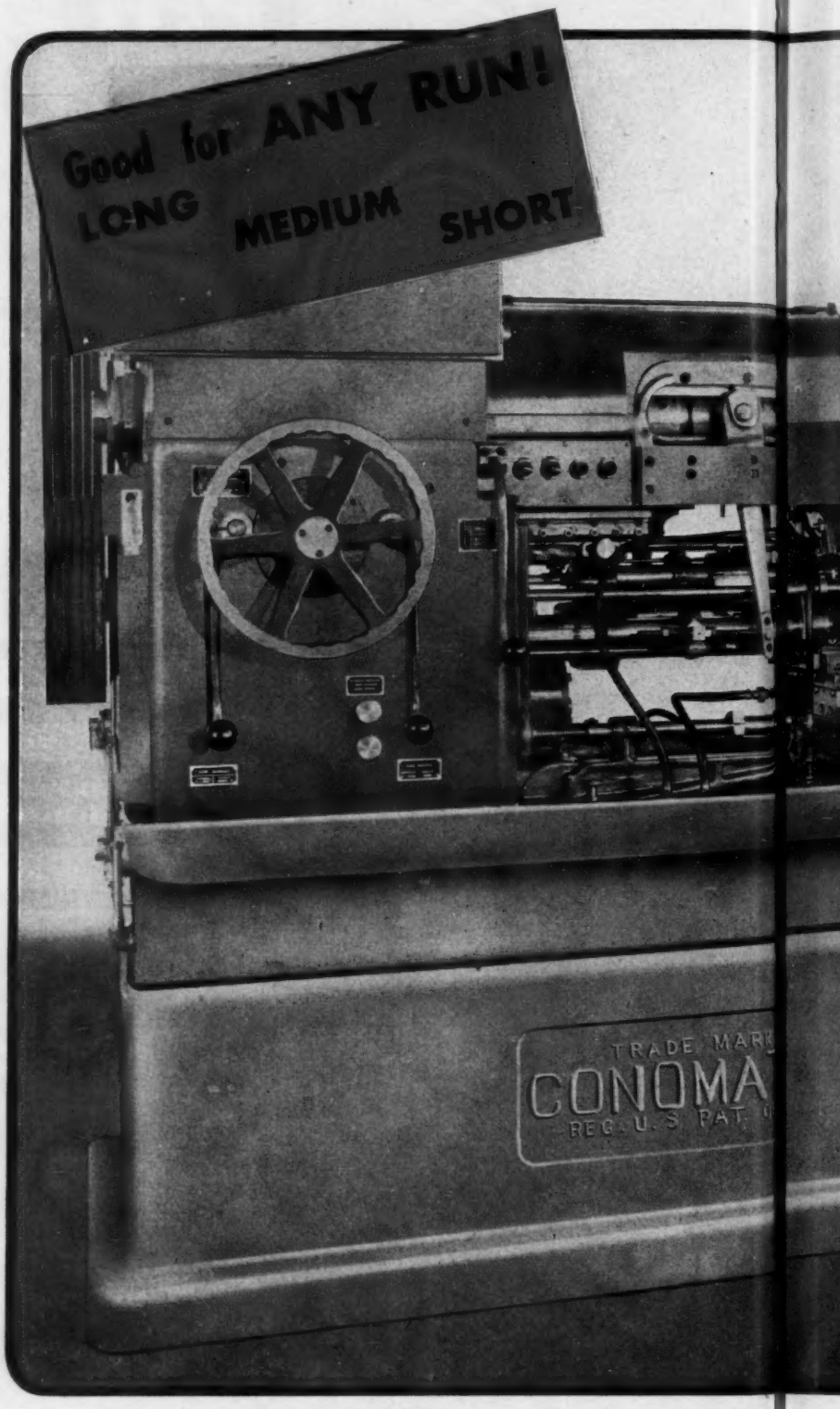
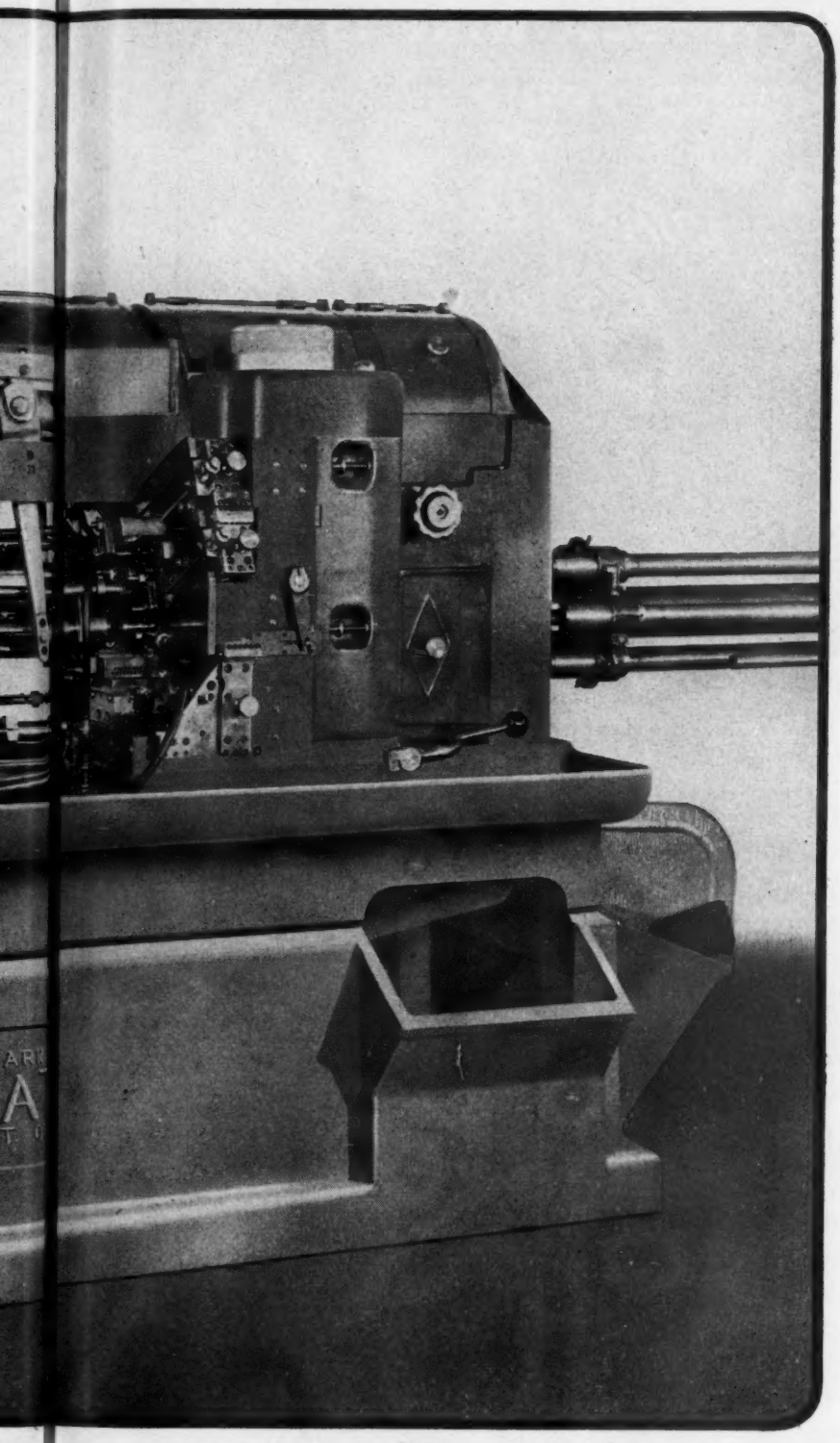
13 Combination forced feed and gravity flow lubricating system with filter and visible flow indicator, with grease fittings for slower moving parts.



COMPARE ITS ★TWELVE

6-SPINDLE CONOMATIC



14 CONE power reverse for all toolslides to hasten tool up and lessen operator fatigue.

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24 Time saving electrical controls that bring free running spindles to dead stop, and prevent machine stopping before its cycle is completed should abnormal overload develop.

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26 Master type collets and pushers for fast change-over standard equipment.

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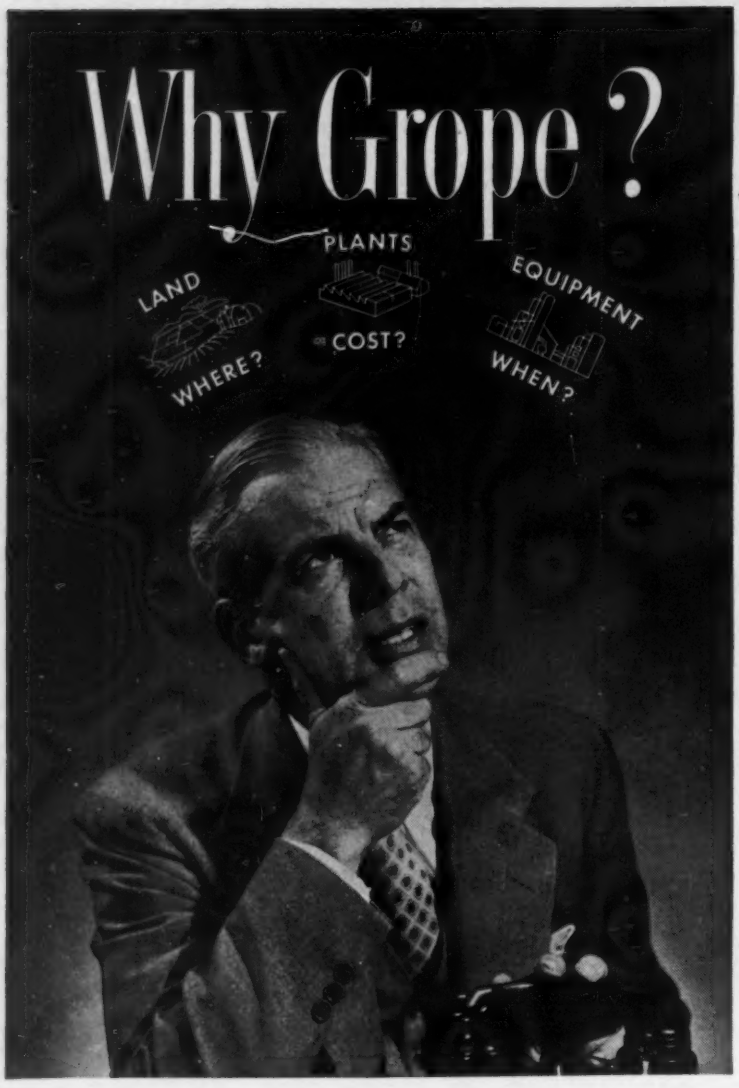

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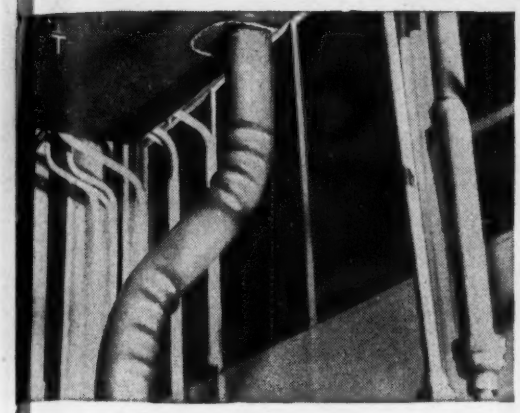
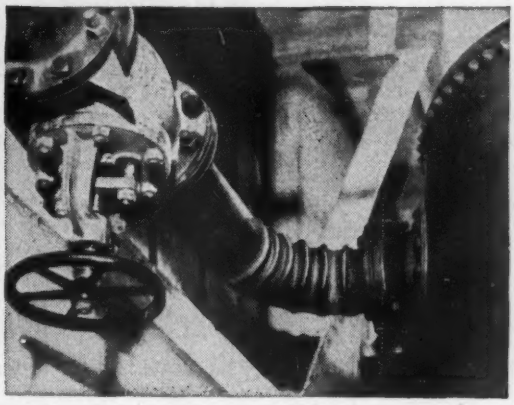
"Tailor-Made" Bends

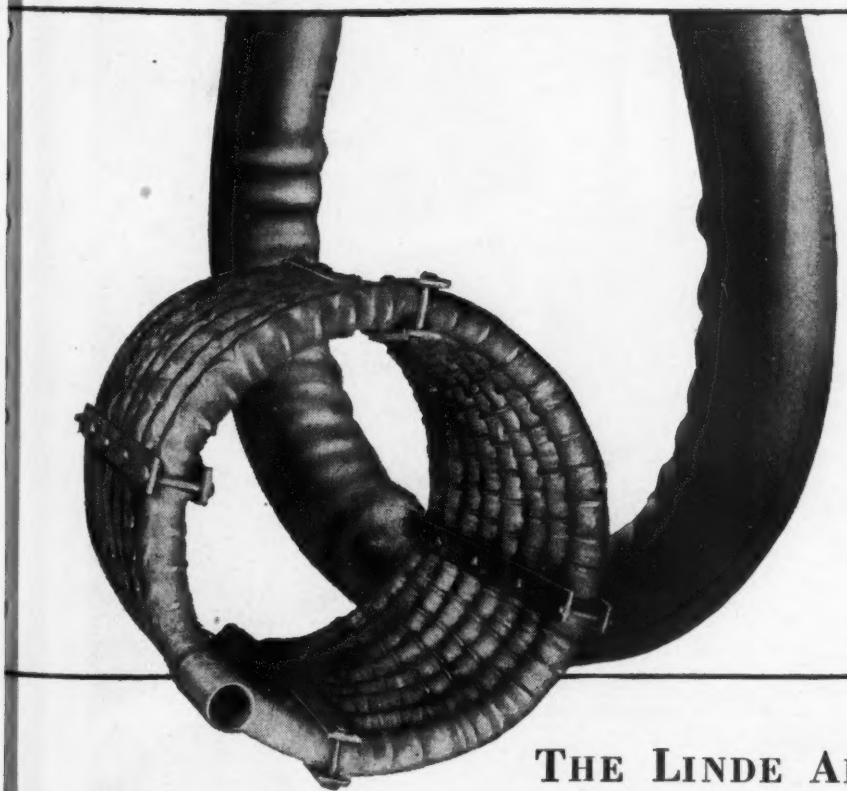


Where compound bends are required in a continuous section of pipe, wrinkle-bends offer an ideal solution. Wrinkle-bends are leakproof, as strong as the pipe itself, require no maintenance, and are easy to insulate.



This short-radius wrinkle-bend joins a compressed air line to a reservoir. Wrinkle-bends can be made in brass, copper, aluminum, and steel pipe from 2 inches to 26 inches in diameter.

Pipe bends can be made right on the spot with the aid of an oxy-acetylene welding or heating blowpipe, a simple bending rig, and a few common tools. Wrinkle-bending does not reduce the thickness of pipe walls.



This condenser coil made from 2-inch stainless steel pipe has 350 wrinkle-bends.

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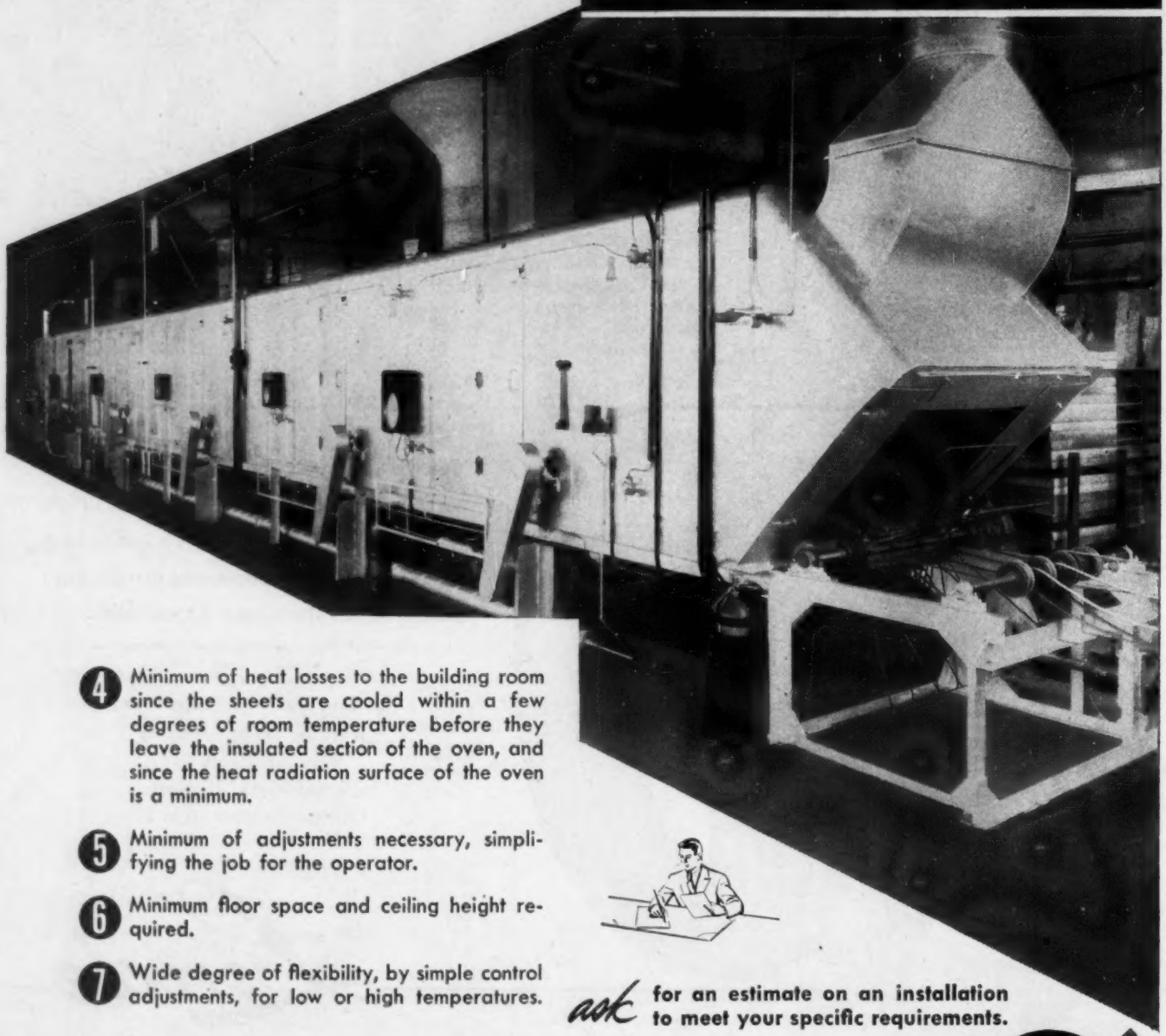

4. Minimum of heat losses to the building room since the sheets are cooled within a few degrees of room temperature before they leave the insulated section of the oven, and since the heat radiation surface of the oven is a minimum.
5. Minimum of adjustments necessary, simplifying the job for the operator.
6. Minimum floor space and ceiling height required.
7. Wide degree of flexibility, by simple control adjustments, for low or high temperatures.

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China, a country of more than 400,000,000 people, represents the greatest untapped market which modern business can contemplate. As a step toward its own modernization that country is now planning construction of by far the largest hydro-electric station ever built. It will be FIVE TIMES GREATER THAN OUR OWN GRAND COULEE.

This undertaking will require $1,000,000,000 and the efforts of hundreds of engineers, hundreds of thousands of laborers. As planned, the project will take six years to complete. The finished dam will rise 500 feet above its foundations, will create the largest man-made lake the world has ever seen. In addition it will largely eliminate floods and droughts in that part of China. Sixty million acres of land will be irrigated. Disease breeding swamps and lakes will be drained. Alongside the dam, a series of shiplocks will raise ocean-going vessels to lake level, making Chungking a modern seaport.

Another $500,000,000 will be needed for China's railroad lines. This money will provide for 30,000 miles of track and the equipment necessary for their operation. More than mere transportation however, this facility not only will contribute to modern industrialization but also be a step toward political coherence in a country now torn by strife.

For not a few of China's economic and political difficulties may be traced to her lack of intra-transportation and communication.

China is now emerging from the throes of distress. Today—despite internal inflation—her governmental debt is trivial. At most she owed $200,000,000 at home and $870,000,000 abroad. Since the end of the war she has already repaid $135,000,000 of her foreign loans.

No greater opportunity ever existed for forward looking American businessmen and the promising technicians which our colleges are sending forth in increasing numbers. China can become the world's great market for the next fifty years.

With $1,000,000,000 for her projected hydro-plant and with $500,000,000 for her railroads, China can begin to plan her industrial future. Construction of these projects can go far toward shaping the living conditions and the accepted ideology of her people.

To hold world leadership we must give as well as take. For us there seems to be no greater opportunity than in China.

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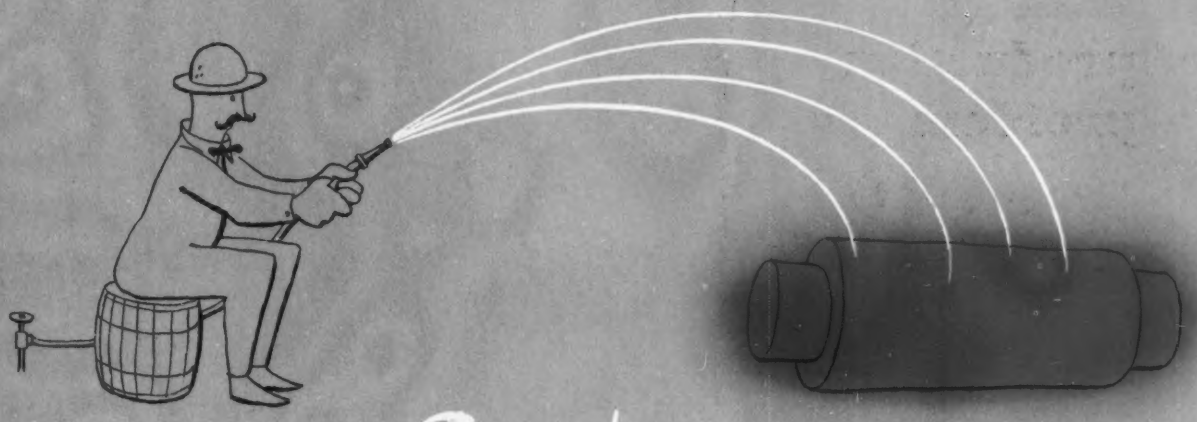
1913 *we developed the first water-cooled process for solidifying heavy bodies of rolls*



So what? In the development of Red Wabbler Rolls many special processes have been pioneered, improved, perfected—and then replaced as the need arose for better mill rolls, and better roll manufacturing methods. But these continuing developments were only possible because of your cooperation as experienced mill operators. Your own demands for greater rolling-mill production, better surface finishes, longer roll life, have been fulfilled by Red Wabbler Rolls because your training has supplied the practical metal-rolling know-how on which Mackintosh-Hemphill engineers and metallurgists base their research. In 1913, or 1923, or 1947—in any year and in every year—the success of metal-rolling operations depends on the skill of the operator and the knowledge and facilities of the roll manufacturer. In the combination of your own rolling-mill experience and Mackintosh-Hemphill roll engineering and manufacturing facilities there's a real productioneering team.

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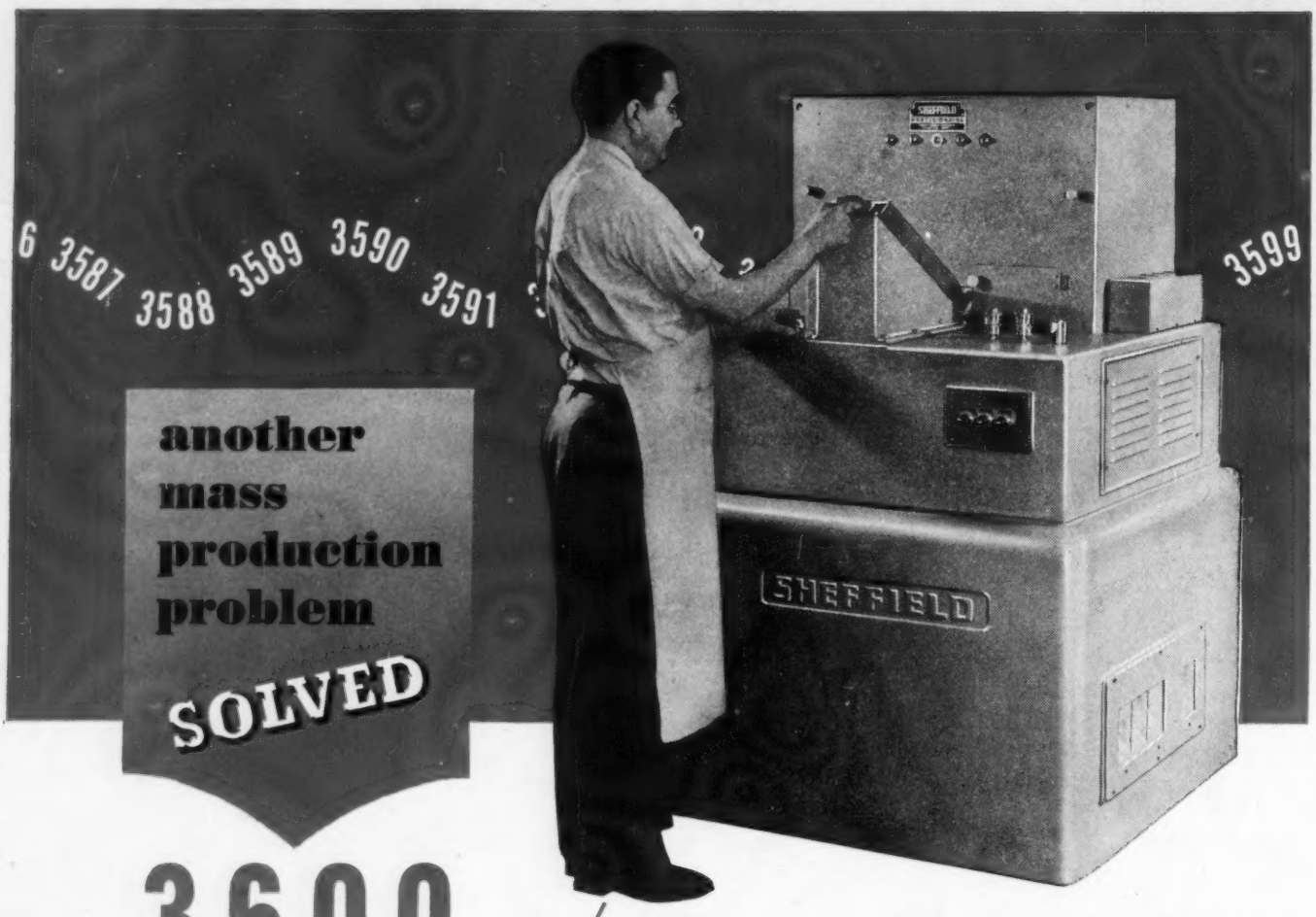

another mass production problem SOLVED

3600 *pistons classified per hour*

Shock absorber pistons come by conveyor from the centerless grinders to this Sheffield "Airlectric" Automatic Gaging Machine for inspection and dimensional classification.

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Cylinder Parts of Solid Steel Blocks

STEEL

The Magazine of Metalworking and Metalproducing

VOL. 121, NO. 13 SEPTEMBER 29, 1947

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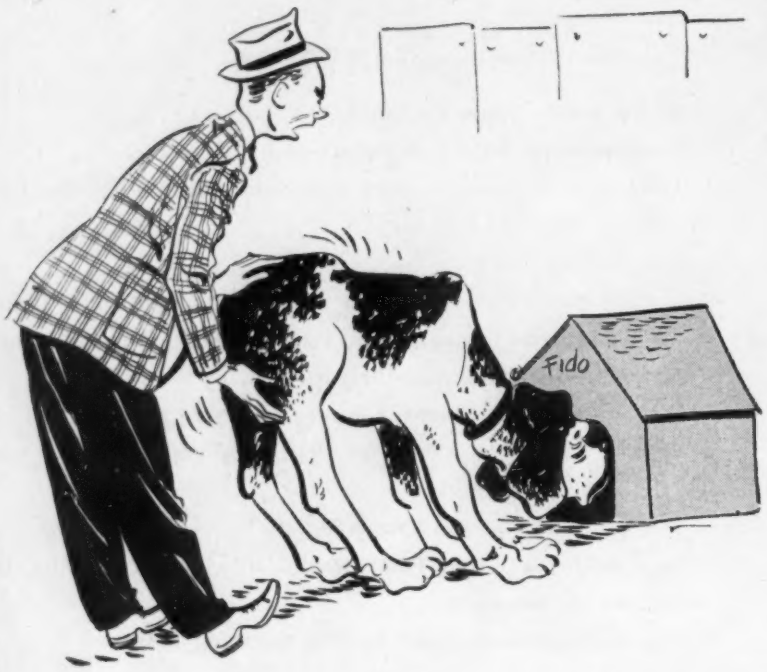
It's Gotta Fit...



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HELP TURN OUT MORE STEEL

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September 29, 1947

Make-Believe Profits

From now until next spring when the annual reports for industrial corporations are issued there will be an unusual volume of criticism voiced against "excessive" profits.

Many companies currently are reporting quarterly earnings that seem high in comparison with those of other periods. It is likewise true that the unsettled conditions of the moment make for a situation in which the consumer feels he is fully justified in questioning profits if they appear to be excessive.

Under these circumstances, officials of companies that currently are reporting abnormally high profits are on the defensive. They will be called upon to explain why they are retaining an excessive portion of the sales dollar for profits instead of passing part of it on to the customers.

One pertinent explanation is that numerous current balance sheets and profit and loss statements prepared under orthodox accounting methods are fictitious. C. R. Cox, president of Carnegie-Illinois Steel Corp., exposed the fallacy of present day financial reports effectively in his address at the annual dinner meeting of the Association of Iron & Steel Engineers at Pittsburgh last week.

He pointed out that dollar costs of steel plant construction increased five times between 1901 and 1946 and four times between 1915 and 1946, that the Bureau of Internal Revenue has recognized no material change in its concept of depreciation in the 34 years since the beginning of federal taxation of income and that eventually allowances for depreciation must be based on replacement cost rather than on original cost.

The result of inadequate reserves for depreciation, he declared, is an understatement of this liability on the balance sheet and a corresponding overstatement of surplus. On the income statement too little depreciation means understatement of production costs and overstatement of profits.

In short, a substantial portion of the seemingly high profits now being reported is make-believe. Mr. Cox urges that this fact be emphasized in the forthcoming annual reports for 1947. The orthodox reports might be accompanied by a balance sheet and earnings statement in which depreciation is figured realistically.

This is a sound suggestion. It should be followed by every company in which depreciation of capital assets is an important factor.

* * *

OUTSTANDING SUCCESS: Today workmen are dismantling the Machine Tool Show. Some machines are being shipped back to exhibitors' plants, others to plants of new owners who purchased them "off the floor." Throughout the nation are scores of thousands of show visitors who are evaluating what they saw and heard at the Chicago show and congress.

Undoubtedly the final verdict will be that the 1947 event was an outstanding success in every important respect. It was successful—not only because of the number, variety and merit of the machines exhibited—but also because in the various conferences comprising the Machine Tool Congress able speakers rendered an exceedingly valuable service in interpreting the role of machine tools in solving today's problems.

The show and congress afforded inspiration to persons whose problems differ widely. To engineers, plant managers and others concerned with productivity within a specific plant, they furnished an abundance of practical demonstra-

(OVER)

tions of how to increase output and reduce costs. To those interested in broader, long-term economic trends, the show and congress opened new vistas as to what money invested in efficient equipment can do in the future to assure a more abundant life for more people. To the nation at large, the exhibition reflected a reservoir of mechanical facilities and know-how that will be indispensable in meeting the challenge of world leadership now confronting us. —p. 76

* * *

EFFICIENT PRODUCTION: In a paper presented at the Machine Tool Congress, Myron S. Curtis, assistant director of engineering, Warner & Swasey Co., revealed that research conducted by the company on the extent and limitations of practical carbide applications yields the conclusion that in the interest of longer cutter life, wherever there is a choice of the combination of speeds, feeds and depth of cut which can be used for the given rate of metal removal, the first choice should be in favor of the heavy depth of cut, the second choice should be for heavy feeds and the third choice should be for high speed.

Mr. Curtis also expressed the opinion that the biggest advance in production efficiency is in the attention which has been paid to reduction of handling time. Electric control in ram-type turret lathes, permitting automatic spindle speed changes and other handling operations previously performed manually, increased productivity from 30 per cent up. —p. 96

* * *

NEW KETTERING-ISMS: Charles F. Kettering's extemporaneous address at the Machine Tool Congress was a masterpiece of strong punch lines on a great variety of subjects. Characteristic are these excerpts:

"I would like to see the show opened up to a lot of principals of schools, preachers and others so that they might see these things by which you make 'slaves' out of American workmen.

"The thing we have done in this country that nobody else in the world has ever touched is the ability to duplicate parts.

"The word 'democracy' is just the long way of spelling 'votes'.

"I never like to think of this country as arriving any place. I think we only want to be interested in progressing.

"All the investigations in the world won't create one ton of rolled sheet." —p. 99

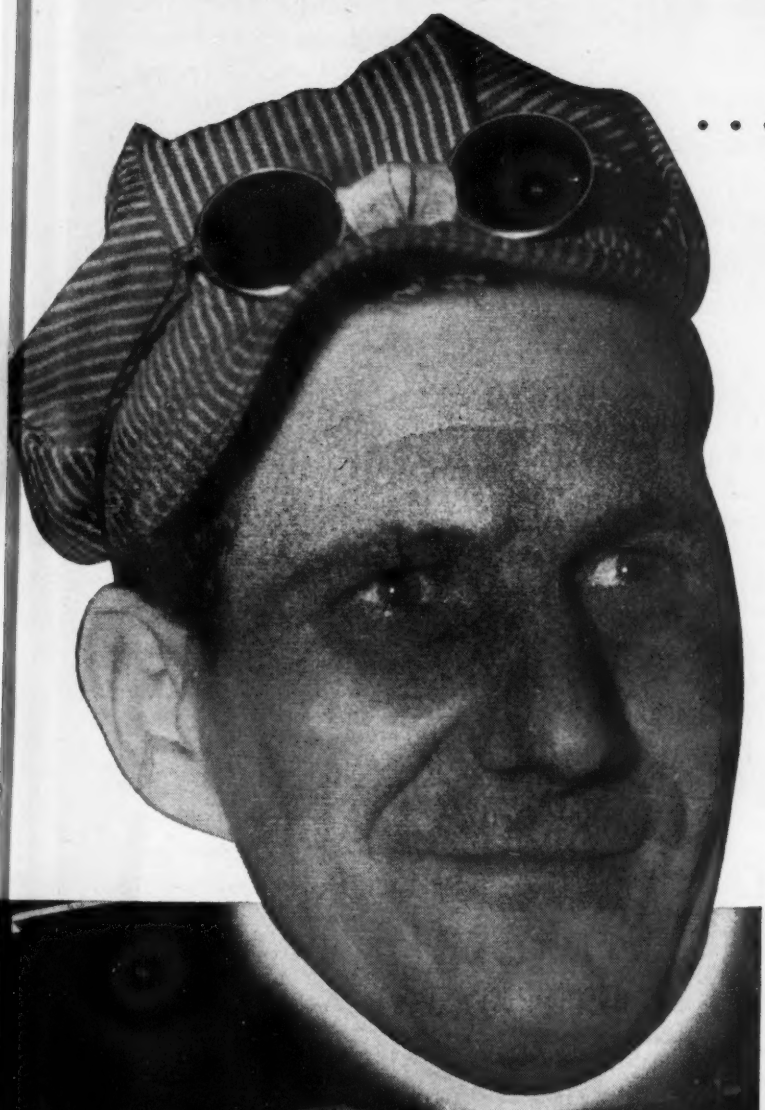
SIGNS OF THE TIMES: Ernest C. Ropes, retiring chief of the Russian Trade Division of the Department of Commerce, believes that three more consecutive 5-year plans will be needed to bring Russian steel output up to two-thirds of America's production. According to Mr. Ropes (p. 54), Russia excels the United States in only three fields of endeavor—meteorology, forestry and soil culture. . . . J. Lester Perry, president of Columbia Steel Co., gave members of the Purchasing Agents Association of Northern California an encouraging picture of steel supply on the West Coast. He pointed out that before the war the capacity for producing finished steel west of the Rockies was 900,000 tons annually and consumption was 2,250,000 tons. Today the capacity for producing finished steel in this area is 2,700,000 tons (p. 52) and completion of rolling mills now under construction will help to synchronize capacity with postwar demand. . . . Week ending Sept. 20 witnessed two gratifying records. Automobile production of 110,088 units was a new postwar high (p. 66) and bituminous coal output of 12,600,000 tons was the highest weekly tonnage recorded since the miners began working under the new contracts. . . . Increased labor costs coupled with favorable experience gained by many users during the war have simplified the task of selling powered industrial trucks. The industry now is operating at a level far above that attained in any previous peacetime period (p. 57) and exceeded only by that of one or two peak war years. . . . Processing and fabricating plants in the Ruhr, including manufacturers of sorely needed agricultural equipment, are operating at only 30 per cent of capacity (p. 59) due to a scarcity of steel caused largely by a coal shortage. . . . A spot check by the editors of this publication of opinions of trade association executives representing a broad cross-section of the steel consuming industries (p. 45) indicates strong opposition to replacing the present multiple basing point system of pricing steel by f.o.b. mill pricing which the Federal Trade Commission appears to favor. . . . According to S. M. Felton, president, American Railway Car Institute, the program calling for building 10,000 freight cars monthly, stated to begin in the third quarter (p. 48), is failing for lack of steel and unbalanced inventories. . . .

E. L. Shaner

EDITOR-IN-CHIEF

Under his Watchful Eye

. . . 6 open hearths



This is Larry McCoy, 34, melter at Inland's No. 2 Open Hearth. Larry started as a laborer in 1936, and in ten years moved up from third, second, and first helper, to melter. He's now responsible for the quality of 1600 tons of Inland steel every day.

McCoy is another of Inland's capable, conscientious men, who have learned steelmaking from the bottom up. The skill and judgment of these men is reflected in every ton of Inland steel.

INLAND STEEL CO., 38 S. Dearborn St., Chicago 3, Ill.
Offices: Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul.

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Durable Goods Producers Favor Steel Price Setup

STEEL
September
29
1947

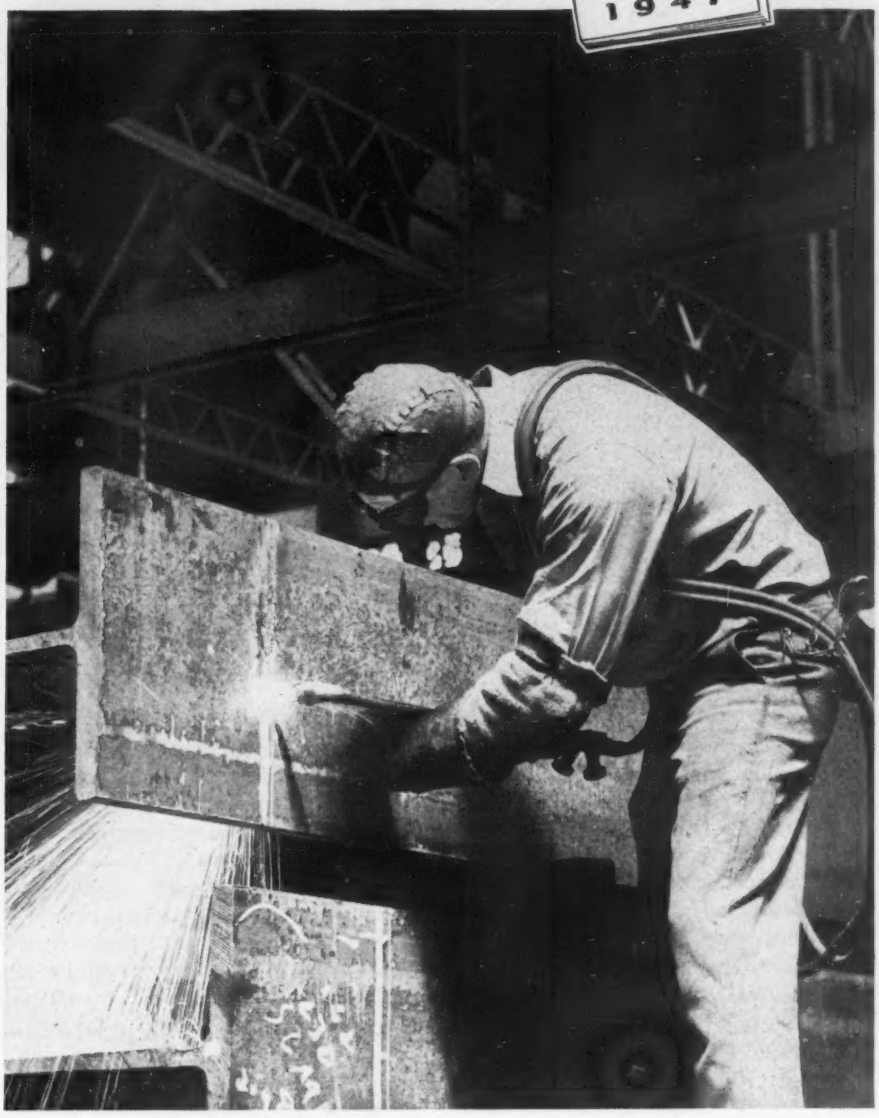
View with concern latest attack of Federal Trade Commission on multiple basing point pricing. Serious economic dislocations feared if f.o.b. mill pricing is forced on steelmakers

MANUFACTURERS of durable goods, to surprising degree, appear to view with considerable concern the renewed attack of the Federal Trade Commission on the multiple basing point system of pricing used in the steel industry.

Spot opinion check by STEEL of trade association executives representing a broad cross-section of the steel consuming industry shows that opinion in these diversified manufacturing fields predominantly is opposed to displacement of the present steel pricing system by f.o.b. mill pricing, which the government agency is reported to favor.

Economic dislocations of the most serious import to the nation are certain to follow in the wake of a change in the steel pricing system, in the opinion of most of the trade association men interviewed. Many companies, it was said, would be forced to move from their present locations to points closer to more adequate steel supply than they now enjoy locally should f.o.b. mill pricing be effected. Further, delivered cost of steel to manufacturing plants would be appreciably increased since manufacturers still would have to go outside home areas to obtain sufficient steel to maintain operations, and in consequence delivered steel costs would vary to the extent of freight cost on steel shipments from the various sources of supply. Manufacturers fortunate enough to have adequate local steel supply would have a decided cost advantage over competitors forced to bring steel in from outside.

Federal Trade Commission attorneys are of the opinion that the new case against steel pricing methods may be pushed to a conclusion "in a fairly short period of time." The facts in connection with steel pricing, they say, are quite well known, so that the task of gathering supporting evidence should not be a complicated one. Unless there are delays not expected at this time, it should be possible within two years—or by the fall of 1949—to complete the preparations for subsequent court action.



Users of steel are keeping close watch on Federal Trade Commission's attack on the basing point system, fearing dislocation should present system be replaced by f. o. b. pricing. Above, a heavy floor beam to be used in the construction of a large new industrial plant is flame cut at a fabricating plant

The procedure as now set up tentatively is as follows:

1—The commission has set Oct. 8 as the deadline for the submission of responses to its charges.

2—After these responses have been studied, the commission will set a date in the latter part of October for starting a series of hearings at which informed witnesses will be questioned as to their knowledge of steel pricing methods. Lynn C. Paulson, the commission's trial attorney in the new steel case, told STEEL that the hearings will be held in those centers that are most convenient for the witnesses. Present indications are that most of the commission's hearings will be held in New York and Washington.

3—Following the conclusion of the commission's hearings, the respondents will schedule a series of hearings to develop testimony in support of their defense arguments.

4—After conclusion of the two sets

50 MILLIONTH TON: United States Steel Corp. pours its 50 millionth ton of steel produced since the guns ceased firing off Tokyo Bay a little more than two years ago. The peacetime milestone is shown at Carnegie-Illinois Steel Corp.'s Edgar Thomson Works, Braddock, Pa.

of hearings, the commission will hear the case and thereafter issue a cease and desist order if the charges are proven by the preponderance of the evidence.

5—The next action will be that of the respondents; they can elect to obey the cease and desist order, or they can appeal to one of the federal circuit courts of appeals to have the order set aside, with a final review by the Supreme Court at the request of one of the parties.

Stripped of legal language, the Federal Trade Commission complaint sets forth two charges of illegality in pricing steel mill products.

One is that the existing "multiple basing point system," based on an industry conspiracy deprives buyers of the advantage which should accrue to them by reason of their proximity to the plants of steel producers.

The other is that the delivered prices quoted by the steel producers often include a freight rate which does not actually figure in the deal—as charging a freight rate from some other mill to the point of delivery, or charging a rail freight rate when the steel was delivered at a lower rate by motor truck or by a water carrier.

Among Washington antitrust law specialists the new steel case naturally is a hot subject for conversation—and it is the belief of most of these specialists that the Federal Trade Commission is going to be successful at least in having phantom freight outlawed in the steel business.

Since the Supreme Court in 1945 handed down its two decisions in the glucose cases it has been generally accepted among the antitrust law specialists that so-called "phantom" or "fictitious" freight rates are illegal.

These cases are pertinent when discussing the steel case because the situation in the glucose industry was in large measure similar to that in steel. Originally glucose production was confined to Chicago and consumers there, mostly candy manufacturers, obtained deliveries by paying a small switching charge. Later, as the West became populated, candy plants were located at Tulsa, St. Louis, Kansas City and other centers. Better to serve these new customers, the Corn Products Refining Co. put up a branch glucose plant at Kansas City, and the A. E. Staley Mfg. Co. put up one at Decatur, Ill. On shipments from these new plants the companies charged the f.o.b. Chicago price plus freight rates from Chicago. The commission charged these "phantom" freight rates as illegal and the Supreme Court upheld the commission.

The fact that the decision operated in favor of the younger western candy manufacturers at the expense of their older competitors in Chicago did not count. The industry was left to stew in its juice. The problems that faced individual candy manufacturers can be better appreciated by explaining that the Supreme Court decisions bettered the competitive position of the newer western candy manufacturers by 4 to 40 cents per 100 pounds of glucose, or 2 to 19 per cent. Glucose then was selling at $2.09 per 100 pounds at Chicago.

But the Federal Trade Commission, in the opinion of Washington legal experts, may encounter trouble in seeking to outlaw the present custom of steel producers in meeting competitors' delivered prices. The Supreme Court already has held that it is not illegal to reduce a price in order to meet a competitor's price. But in the steel case the commission has charged that "matching" of prices is a key factor in an industry conspiracy. There is no safe ground for trying to anticipate what the Supreme Court will decide.

Intentions of Congress an Issue

As an instance of the uncertainties in which steel company attorneys must proceed in this new case, it is recalled that attorneys of the Corn Products Refining Co. held that Congress, by refusing to outlaw all basing points under the Robinson-Patman Act, had indicated an intention to sanction such systems. The Supreme Court rejected this reasoning. The legislative history of the act, said the court, "indicated only that Congress was unwilling to require f.o.b. factory pricing, and thus to make all delivered price systems and all basing point systems illegal per se." Then the court unlimbered its heaviest artillery by stating its belief that Congress had left such matters to the courts.

"On the contrary," said the decision in the Corn Products case, "we think that it (Congress) left the illegality of such systems to be determined as they might be within the reach of Section 2 (a), as enacted, and its more restricted prohibitions of discriminations in delivered prices."

But, in the Corn Products case the Supreme Court also threw out the Federal Trade Commission's contention that the use of a basing point system is illegal. It said "no attempt has been made to determine whether any multiple-basing point system is permissible under the Clayton Act." It now looks as though the precedent in this important angle may be set by the decision in the new steel case.

There is a procedure which might be employed in the steel case. That is by going to Congress and asking

for relief. The two committees having custody of the antitrust laws, the House and Senate Judiciary Committees, undoubtedly would be glad to listen to complaints as to what a ban on meeting competitors' delivered prices would mean to the economy. There is a possibility that Congress would revise the antitrust laws and spell out specific violations if it realized the possible consequences of this case in localizing the steel industry throughout the nation and forcing tens of thousands of consumers to buy from but one mill instead of dealing with different mills at the same delivered price as is the custom under today's steel market conditions.

Congress regularly revises old legislation when the need for such action is pointed out. Two spectacular instances occurred this year when the Wagner Act was amended by the Taft-Hartley Act and the Fair Labor Standards Act was amended by the Portal to Portal Act.

As far as recalled, no business interests ever have gone to Congress for revision of the antitrust laws. Such amendments as have been enacted from time to time have been requested by the interested federal agencies—and the results have ever tightened industry's strait jacket. The Robinson-Patman Act, for example, resulted from the complaint of the Federal Trade Commission that the exemptions in section 2 of the Clayton Act stymied enforcement activities.

Lauds Army's Proposal To Accelerate Flow of Scrap

War Department's recent announcement it plans to accelerate the flow of iron and steel scrap from its installations in the United States is a helpful and co-operative step in view of the scarcity of scrap over the nation, said Robert W. Wolcott, chairman of the Steel, Foundry & Scrap Industries' Committee for expediting iron and steel scrap.

The War Department reported it expected to produce approximately 500,000 tons of scrap by July, 1948, through demilitarization of obsolete or obsolescent ammunition. To spur the output of scrap essential to the manufacture of steel, Secretary of War Royall designated Mr. Wolcott's committee to serve with his department in an advisory capacity.

Mr. Wolcott estimated governmental agencies possess between two and three million tons of potential scrap. That total includes upwards of 300,000 tons of scrap in Europe under Army control.

Consumers To Receive Third More Steel This Year Than in 1946

METALWORKING industries this year will receive almost a third more steel than they obtained in 1946, provided steel production and distribution during the remainder of the year follows the pattern established in the first half.

Indications now are that steel consumers will receive about 62 million tons of finished products, a peacetime record, according to the American Iron & Steel Institute.

First half distribution figures indicate warehouses and distributors of steel will handle about a million tons more than in 1946. The automotive industry should receive 2.5 million tons more. Railroads will receive 1.2 million tons more than last year. Oil and gas drilling industry may more than double its 1946 receipts, with a total gain of 550,000 tons going directly to this group. Construction industry probably will get 1.3 million tons more this year.

Warehouses and distributors who serve many of the smaller metalworking companies were the leading recipients of steel in the first six months, getting 16.8 per cent of the total or 5,235,554 net tons.

The automotive industry ranked second (first among actual steel consuming industries) with 14.6 per cent or 4,564,694 net tons. In the full year 1946, they received 6,557,199 tons, or 13.4 per cent of the total produced in that year.

Rail transportation obtained 7.9 per cent of first half shipments, 2,470,482 tons, almost two-thirds the

(*Please turn to Page* 148)

Present, Past and Pending

■ BRITISH COAL MINES ORDER NEW EQUIPMENT
LONDON—National Coal Board of Great Britain has placed orders for $9 million of mining machinery as first step in a 15-year modernization program.

■ COKE OVEN CONTRACT PLACED
CLAIRTON, PA.—Carnegie-Illinois Steel Corp. has awarded a contract to Koppers Co. Inc. for construction of a new battery of 85 coke ovens and the rebuilding of a 61-oven battery at the Clairton Works.

■ FINES LEVIED AGAINST BEARING COMPANIES
CLEVELAND—Maximum fines totaling $40,000 were announced here last week against six American ball bearing companies and two individuals charged by the federal government with conspiring to fix prices on ball bearings. The defendants entered pleas of nolo contendere.

■ INTERNATIONAL HARVESTER TO SPEND $5 MILLION
CHICAGO—International Harvester Co. soon will start a modernization program at its West Pullman, Ill., works to cost $5 million.

■ RHEEM INTRODUCES NEW LINE OF FURNACES
SAN FRANCISCO—Rheem Mfg. Co. is starting manufacture of a new line of oil-fired winter air conditioning furnaces and coal-fired gravity furnaces to round out its gas furnace and appliance lines introduced earlier this year.

■ K-F PRODUCES 100,000TH AUTOMOBILE
DETROIT—Kaiser-Frazer Corp. last week produced its 100,000th automobile. It was the 88,246th vehicle to come off the Willow Run assembly lines this year.

■ STRUCTURAL BOOKINGS 26% ABOVE PREWAR LEVEL
NEW YORK—Bookings of fabricated structural steel for August totaled 142,677 tons, a decrease of 6.5 per cent from July, but 26 per cent above the average for the five prewar years, 1936-40.

■ GENERAL ELECTRIC BUILDING WESTERN MOTOR PLANT
SAN JOSE, CALIF.—Judson-Pacific-Murphy Corp. will fabricate and erect structural steel for General Electric's new $2 million electric motor plant here. Company expects to start operating the plant in 1948.

Car Steel Supply Held Inadequate

Second quarter building program failed and third quarter schedule is failing, car institute head declares. Balanced car sets needed

FREIGHT car building program, calling for 10,000 units monthly and which was slated to begin in the third quarter, is failing for lack of adequate steel supply, S. M. Felton, president, American Railway Car Institute, declared last week.

Statistical survey of the steel supply situation in 19 plants building freight cars reveals a marked shortage, he said. Pointing out that under the proposed 7000-car program scheduled for the second quarter of this year commercial car builders were to have delivered 85 per cent, or 5950 cars a month, and that under the 10,000-car monthly program slated to begin in the third quarter they were to have built 8500 cars a month, Mr. Felton said that at no time had builders received nearly enough steel and that actually during July enough new car steel was received by the builders to produce only 4500 cars, or a little more than half required to meet the program. The 7000-car program failed, he said, and the 10,000-car program is failing because of this situation.

Complicated by Imbalances

In addition to the overall shortage of steel, the situation is further complicated by the fact that steel received and inventories on hand have been unbalanced, he asserted. A sustained high production rate, he emphasized, can be maintained only if there is available adequate supply of steel in balanced car sets.

Continuing, Mr. Felton pointed out that the survey indicated there had been a fairly good increase in monthly steel supply during the first quarter of this year, as compared with the very low January figure of 52,000 tons. Thereafter, however, the increase planned for the second quarter was not large and during July, when rollings were scheduled for the 10,000-car program, steel receipts showed an actual decrease of 17 per cent, as compared with June.

Mr. Felton stressed the importance of an adequate lead time. During the war, he pointed out, the government established a lead for car builders of 120 days. The car builders today are seeking a lead of only 90 days, but have not been receiving enough steel, he asserted, to provide them with anything even approaching that length of time.

Steel inventories have risen steadily this year but not fast enough—from 112,000 tons in January to 243,000 tons in June, it was pointed out by Mr. Felton.

He believed that some of the current confusion arises from an assumption by some that all steel, for all purposes, shipped to railroad car builders and railroad shops is for new domestic freight cars. This, he said, is definitely not the case. Substantial quantities of steel go into maintenance and repairs and Mr. Felton emphasized that car builders had no quarrel with that idea. Maintenance and repairs are essential, he said, with the car builders themselves producing underframes and other parts for delivery to railway shops. But this tonnage, he insisted, should not be thought of as going into new equipment.

Also, he pointed out, various commercial shops have long-established specialty lines of their own, such, for instance, as mine cars, passenger and street car and bus transportation equipment and, in certain cases, tanks. Steel for these requirements should not be taken into account in an attempt to appraise the amount of steel going to car builders for domestic freight cars. However, he thought, was confident in fact, that certain of these lines were actually taking little steel at this time. Export requirements, he indicated, are now negligible.

O'Mahoney Asks Check On Large Corporations

An attack on large corporations as "economic governments more powerful than some states" was voiced by Sen. Joseph O'Mahoney (Dem., Wyo.) before the American Bar Association meeting in Cleveland last week.

Senator O'Mahoney contended the law has lagged behind business organization and that lawyers should lead in organizing the economic system "so that it will be the servant of the people and not the master."

"The concentration of economic power has taken place because inadequate existing law has been exploited by those who did not realize that in building up the modern collective industrial corporation they were laying the basis for collective government," said Sen. O'Mahoney.

Price Investigators Told Durable Goods Advance Less than Consumers' Items

PRICES for industrial products have increased less and more slowly than have those for agricultural and allied products, industrial wages and personal services.

This was the evidence offered last week before various hearings on the inflation problem.

Appearing before a subcommittee of the Congressional Joint Committee on the Economic Report at Cleveland, Charles M. White, president of Republic Steel Corp., demonstrated the advance in steel prices has been modest when compared to other price increases.

Steel prices have advanced only 38 per cent since 1939, said Mr. White. During the same period, steelmaking costs have advanced 70 per cent, including an advance of 85 per cent in the wages paid to steelworkers.

Mr. White pointed out that while steel prices were advancing 38 per cent, the wholesale price of all commodities advanced 99 per cent.

Relating the increase in steel prices to per capita consumption, about 1000 lb a year, Mr. White figured steel is costing the average person $9 more a year than it did in 1939.

By comparison, the average steelworker at Republic is receiving $1,574.84 more in wages than he received in 1939.

Food expenditures in 1939 averaged $160.85 per capita per year. Today the average is $314.14, an increase of $153.29.

Testimony in similar vein was presented before the economic institute of the Chamber of Commerce of the United States in Washington by E. S. Mason, Harvard University. Professor Mason pointed out that prices of industrial products are relatively

stable. It is not the prices of items produced by the heavily concentrated industrial sectors of the economy—iron, steel, petroleum products, heavy chemicals, aluminum, glass, etc.,—but rather the items produced in the competitive markets—grains, poultry, dairy products, textile fabrics, lumber, etc., that have led the way in the present upswing," he said.

"It is not the prices of motor cars as sold by the 'big three' that have soared out of sight but rather the prices of the so-called used cars sold on the more competitive markets. And when the output of concentrated industries has risen in price the cause of the rise in price is, as likely as not, to be found in substantial wage rate increases," stated Professor Mason.

National Malleable Plans Chicago Reception, Sept. 30

To mark its 75th year in the Chicago area, National Malleable & Steel Castings Co. will hold a reception Sept. 30 at the Blackstone Hotel for railroad and railroad supply executives of the district.

Cleve H. Pomeroy, president of the 78-year-old railroad supply and castings firm, and other executives from the Cleveland headquarters will attend. These include Wilson H. Moriarity, vice president; Walton L. Woody, vice president; H. L. Mausk, manager of railway sales; James A. Slater, assistant to president; L. A. Pomeroy, traffic manager; H. W. Gilbert, assistant to president; and K. L. Selby, engineering assistant.

National Malleable operates foundries at Cicero and Melrose Park and in Cleveland, Indianapolis and Sharon, Pa. A similar reception is scheduled for St. Paul on Oct. 2.

WAA To Sell 4500 Tons of Pipe to Western Farmers

Some 4500 tons of steel pipe will be made available to western farmers for use in wells for watering livestock and for irrigation purposes. Pipe has been held by various government agencies, and a substantial portion is from stocks ear-marked for lend-lease aid to Russia.

Its transfer to western farmers results largely from the investigation by the steel subcommittee of the Senate Small Business Committee, which disclosed livestock was being moved to market before it was ready because watering facilities were not available.

The subcommittee has received assurances from Secretary of Army Royall that army authorities in Germany are making a careful check to insure that Army scrap in that zone will be shipped to the United States.

Committee spokesmen have no plans to recall steel producers who appeared before the subcommittee Sept. 12, although if the producers have further statements to make a date will be set to accommodate them.

SHIPMENTS OF FINISHED STEEL PRODUCTS—JULY AND FIRST SEVEN MONTHS, 1947

(All Grades Including Alloy and Stainless)

Steel Products	Number of companies	Items	JULY - 1947			To Date This Year			Whole Year 1946		
			Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale) (Net Tons)	Per cent of Total Shipments	Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale (Net Tons)	Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale) (Net Tons)	Per cent of Total Shipments	Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale (Net Tons)	Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products For Resale) (Net Tons)	Per cent of Total Shipments	Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale (Net Tons)
Ingots, blooms, billets, tube rounds, sheet and tin bars, etc.	41	1	312,212	6.3	141,685	1,638,174	4.5	1,265,270	1,949,624	4.0	1,645,748
Structural shapes (heavy)	13	2	357,317	7.2	131	2,581,380	7.1	1,938	3,474,284	7.1	5,399
Steel piling	3	3	26,891	0.5	-	187,651	0.5	23	205,313	0.4	141
Plates (sheared and universal)	29	4	464,214	9.3	14,867	*3,618,656	10.0	124,127	4,152,181	8.5	250,709
Skelp	6	5	6,492	0.1	28,168	92,766	0.3	223,583	227,033	0.5	194,666
Rails—Standard (over 60 lbs.)	4	6	176,870	3.6	200	1,294,052	3.6	662	1,790,311	3.7	4,890
—All other	5	7	22,607	0.4	100	118,517	0.3	267	144,999	0.3	426
Joint bars	7	8	14,382	0.3	1,456	106,662	0.3	9,015	176,803	0.4	5,327
Tie plates	8	9	43,116	0.9	408	296,987	0.8	3,385	447,496	0.9	18,700
Track spikes	8	10	13,180	0.3	-	102,953	0.3	74	146,194	0.3	693
Hot Rolled Bars—Carbon	33	11	493,323	9.9	55,123	*3,659,336	10.1	454,010	5,006,859	10.3	707,991
—Reinforcing—New billet	16	12	102,041	2.1	1,171	719,287	2.0	5,474	1,048,483	2.1	7,381
—Rerolled	11	13	17,197	0.3	-	* 94,074	0.3	-	141,346	0.3	1,267
—Alloy	27	14	127,524	2.6	17,081	1,039,806	2.9	127,592	1,390,278	2.8	138,395
—Total	45	15	740,085	14.9	73,375	*5,512,503	15.3	587,076	7,586,966	15.5	855,034
Cold Finished Bars—Carbon	29	16	108,107	2.2	871	897,060	2.5	5,363	1,316,579	2.7	2,428
—Alloy	26	17	14,671	0.3	211	142,247	0.4	1,113	196,237	0.4	1,725
—Total	35	18	122,778	2.5	1,082	1,039,307	2.9	6,476	1,512,816	3.1	4,153
Tool steel bars	19	19	5,161	0.1	453	53,250	0.1	3,203	96,020	0.2	371
Pipe & Tubes—Butt-weld	15	20	128,558	2.6	5,576	962,295	2.7	38,200	1,276,289	2.6	45,393
—Lap weld	8	21	27,797	0.6	21	228,285	0.6	679	305,516	0.6	238
—Electric weld	11	22	96,865	1.9	23	595,894	1.6	1,013	674,459	1.4	591
—Seamless	10	23	161,842	3.2	7,840	1,210,401	3.3	81,686	1,871,540	3.8	83,441
—Conduit	7	24	13,600	0.3	578	83,878	0.2	4,877	98,521	0.2	2,448
—Mechanical and pressure tubing	13	25	51,051	1.0	1,537	380,187	1.1	11,831	429,180	0.9	3,478
Wire rods	22	26	47,187	0.9	26,235	* 377,534	1.0	188,700	679,998	1.4	346,506
Wire—Drawn	39	27	175,530	3.5	13,823	*1,465,126	4.1	105,165	1,933,124	4.0	135,592
—Nails and staples	18	28	55,640	1.1	652	483,120	1.3	4,762	636,632	1.3	797
—Barbed and twisted	15	29	18,515	0.4	12	143,663	0.4	36	207,610	0.4	-
—Woven wire fence	13	30	28,654	0.6	251	237,433	0.7	2,125	383,230	0.8	-
—Bale ties	12	31	9,449	0.2	-	71,545	0.2	-	99,993	0.2	-
Black Plate—Ordinary	9	32	63,363	1.3	168	477,445	1.3	1,610	781,167	1.6	3,179
—Chemically treated	8	33	761	-	-	15,583	-	-	125,170	0.3	-
Tin and Terne Plate—Hot dipped	9	34	184,562	3.7	-	1,151,813	3.2	228	1,924,657	3.9	-
—Electrolytic	9	35	138,947	2.8	-	872,728	2.4	529	909,173	1.9	-
Sheets—Hot rolled	30	36	561,023	11.3	47,688	4,135,722	11.4	343,958	5,521,463	11.3	421,198
—Cold rolled	17	37	441,294	8.9	1,877	3,128,721	8.7	14,490	4,075,554	8.4	3,397
—Galvanized	16	38	131,373	2.6	22	923,175	2.6	214	1,462,053	3.0	1,725
—Electrical and enameling	10	39	47,780	1.0	78	333,374	0.9	385	435,170	0.9	-
Strip—Hot rolled	23	40	131,446	2.6	20,946	1,000,152	2.8	165,904	1,363,812	2.8	237,176
—Cold rolled	34	41	115,878	2.3	2,128	928,942	2.6	16,554	1,282,146	2.6	25,904
Wheels (car, rolled steel)	5	42	24,380	0.5	-	211,712	0.6	2	252,308	0.5	348
Axles	5	43	13,766	0.3	-	103,794	0.3	53	130,461	0.3	221
All other	-	44	-	-	-	-	-	-	6,266	-	-
TOTAL STEEL PRODUCTS	141	45	4,974,566	100.0	391,380	*36,165,380	100.0	3,208,100	48,775,532	100.0	4,297,889

* Adjusted. Report from American Iron & Steel Institute.

Steel Engineers Discuss Major Technical Problems at Meeting

Annual convention of Association of Iron & Steel Engineers at Pittsburgh attracts 2500 delegates. Technical sessions devoted to wide range of subjects. Consumer interest in meeting heightened by supply implications for future

WITH manufacturing industry chewing up steel at the greatest peacetime rate in history and exerting unrelenting pressure on the mills for more and more tonnage, last week's meeting of the Association of Iron & Steel Engineers at Hotel William Penn, Pittsburgh, received more than routine attention from steel consumers.

The reason for this greater than ordinary consumer interest in a specialized technical convention was not hard to deduce—consumers are acutely conscious of the key role the steel engineers play in the present all-out effort of the steel industry to match output with demand. To large extent, steel buyers realize, hopes for relieving the current steel shortage over coming months rests upon the success attending these engineers' efforts to increase output through utilization of new and improved production processes and methods.

Subjects discussed at the convention attested the sensitiveness of the steel engineers to the clamor for steel. The thirteen technical sessions held during the 4-day meeting were devoted to discussions of varied subjects bearing directly on the production problem. Many of them were of vital interest to consumers, including use of oxygen in steelmaking, the newly developed process which is being studied and experimented with on a wide scale in the hope its practical application will enable a substantial increase in production with existing facilities.

Among other subjects on the program were: "Operation and Maintenance of Variable Voltage Control Systems"; "The Montgomery Y-Mill —A New Type of Cold Strip Mill"; "New Techniques in Conditioning Stainless Steel"; "Industrial Uses of Synthetic Lubricants"; "Proposed New Crane Specifications"; "Prevention of Some Mechanical Failures in Steel Plant Equipment"; "Preparation of Coal for Coke Production"; and "Soaking Pit Operation." Abstracts of these and other papers will appear in an early issue of STEEL.

Ross E. Beynon, superintendent, Rolls Shop Division, Carnegie-Illinois Steel Corp., South Chicago works, was voted first prize in the Kelly Award for 1946 for his article on "Rail Mills and Rail Mill Roll Design." Second award went to Frank Janecek, blast furnace engineer, Republic Steel Corp., Cleveland, for his article on "Blast Furnace Operation Under Elevated Top Pressure." R. E. Dienst, production and cost analyst, Great Lakes Steel Corp., Detroit, was awarded third prize for his article, "Aid To Control of Open Hearth Operations by Statistical Methods." The Kelly awards are granted each year for the best articles appearing in the Iron & Steel Engineers' publication.

Carnegie-Illinois President Speaks

C. R. Cox, president, Carnegie-Illinois Steel Corp., addressed the annual dinner meeting, pointing out that between 1901 and 1946 dollar costs of steel plant construction increased five times. He said allowances for depreciation must eventually be based on "replacement cost" rather than "original cost."

Mr. Cox said that heavy industries such as steel suffer most severely the penalties for inadequate reserves to meet advancing dollar prices. "This continuing change in the value of the dollar, coupled with the legal fiction that there is no such change, places productive enterprise in an awkward position. The federal tax nominally imposed only on income becomes in effect an actual assessment levied on capital investment. This levy, entirely beyond the original intent of the law, comes about through the failure to provide adequate reserves for the depreciation of capital assets," Mr. Cox pointed out.

"The Bureau of Internal Revenue has recognized no material change in its concept of depreciation in the 34 years since the beginning of constitutional taxation of income by the United States government. But conditions have changed radically," Mr. Cox said.

Examining the effect of inadequate reserves for depreciation, Mr. Cox said that to balance the statement of financial condition, and understatement of this liability means a corresponding overstatement of surplus. Similarily on the income statement, he said, too little annual depreciation means the understatement of producing costs and the overstatement of profits.

A. J. FISHER

Newly elected president of Association of Iron & Steel Engineers

Calling for corrective measures, he proposed: (1) Convey correct information on earnings and financial condition to all concerned, as, for example, by including in the annual report an explicit evaluation of the depreciation of facilities in current dollars and the deficiency resulting from the expression of this depreciation in terms of original dollar cost. The effect of the deficiency should be carried through the statements of earnings and financial condition to make clear even to a casual reader the true earnings and actual additions to productive investment. (2) Work for a revision of law and regulations to tax only true earnings and not capital as income.

Concluding, he said: "When industry fails to constantly replace their producing facilities with the fruits of technological advancement, which are cost-reducing, quality-improving devices, the entire economy suffers. Dwindling funds for replacement, are a consequence of faulty depreciation accounting.

"The American economy is based on a constantly rising standard of living, in turn based on technological

advancement. The act of limiting such technological advancement is a blow at the rising standard of living. Corrective action is imperative—and at once."

The convention attracted about 2500 persons. In addition to the purely technical sessions the program included an inspection trip of the facilities built during the war at Homestead works of Carnegie-Illinois Steel Corp.

No exposition was held this year, but at next year's meeting, scheduled for Cleveland, Sept. 28-30, there will be an exhibitors' show.

A. J. Fisher, fuel engineer, Bethlehem Steel Co.'s Sparrows Point plant, was elected president of the association for the calendar year 1948. C. H. Williams, chief engineer, Pittsburgh district, Carnegie-Illinois Steel Corp., was elected vice president; and A. S. Glossbrenner, assistant vice president of operations, Youngstown district, Youngstown Sheet & Tube Co., elected second vice president. John F. Black, general superintendent, Colorado Fuel & Iron Corp., Wickwire Spencer Steel Division, was elected treasurer; and I. N. Tull, electrical superintendent, Republic Steel Corp., was elected secretary.

Gray Iron Founders Meet In Milwaukee, Oct. 2-3

Gray Iron Founders' Society Inc. will hold its 19th annual meeting Oct 2-3 at the Hotel Schroeder in Milwaukee.

Featured at the conference will be addresses by Herbert L. Tigges, vice president and sales manager, Baker Bros. Inc., Toledo, O., who will discuss "The Need for Better Selling Today"; John Lovett, general manager, Michigan Manufacturers' Association, Detroit, who will speak on "Labor Relations Problems Under the Taft-Hartley Act"; B. A. Krawczyk, compensation department supervisor, Allis-Chalmers Mfg. Co., Milwaukee, whose subject is "Regularization of Employment in Gray Iron Foundries"; William Kerber, vice president, Hanna Furnace Co., Detroit, who will review "The Outlook for Foundry Pig Iron"; Samuel Weiss, executive secretary of American Coke & Coal Chemicals Institute, Washington, who will survey "The Outlook for Foundry Coke"; Edwin C. Barringer, executive secretary, Institute of Scrap Iron & Steel Inc., Washington, who will talk on "The Outlook for Cast Scrap"; and Dr. Alfred P. Haake, economist, Chicago, whose subject is "What's Ahead for Business?"

Guaranteed Annual Wage Implies Planned Economy, Less Freedom

Brookings Institution study warns that general adoption in durable goods industries would mean large measure of freezing workers in present jobs, with less opportunity for advancement and expansion

WIDESPREAD acceptance of guaranteed annual wage plans in the durable goods industries implies more public programming, more regulation and less opportunity for advancement and expansion.

This is one of the conclusions in a study of "The Guarantee of Annual Wages," recently completed by A. D. H. Kaplan for the Brookings Institution, Washington.

Although union demands for guaranteed wage plans in the metalworking industries were tabled during wage contract negotiations earlier this year, the issue will remain dormant only as employment continues high. First signs of a recession and dwindling employment will revive demands for some form of wage security. When that time comes, Mr. Kaplan's study will come in for a lot of consideration.

The Brookings study was started soon after the annual wage issue was brought to public attention through a demand presented by the United Steelworkers of America to the National War Labor Board for a guaranteed wage plan. The demand was turned down by the NWLB at that time but an advisory board of the Office of War Mobilization & Reconversion was instructed to make a study of the issue.

After the war, when labor-management relations were returned to collective bargaining between the unions and employers, the demands for annual wage plans were placed on the agendas of most unions representing workers in the metalworking industries. During negotiations, however, these demands gave way to those for wage increases and other immediate economic concessions.

Mr. Kaplan approaches the issue of guaranteed wages on the basis of the longer-run implications of a general adoption of annual wage agreements. Earlier studies generally have comprised appraisals of individual company plans.

The Brookings study is concerned with the impact that widespread adoption of wage guarantees would have on total employment, on competitive practices, and on business fluctuation that make for insecurity. It analyzes the position of labor, the proposals to tie in guaranteed wage plans with unemployment compensation, the difficulties of regularizing employment and production. It finds that the carryover of experience with existing or previous plans does not form an adequate basis on which to project plans covering the basic industries.

"Obviously, the greatest difficulty in achieving stabilized payrolls is in durable goods where production is in response to special orders for replacement of new business. To saddle those industries in advance with any substantial employment overhead would mean either (a) disproportionate price rises in durables generating resistance to investment, or (b) public programming of large sectors of the economy to match their commitments," Mr. Kaplan says.

Would Have Far-reaching Effects

"To start with the guarantee of annual wages as an obligation upon an industry which is not adequately prepared to meet the commitments would set into motion defensive measures tending to diminish rather than increase opportunities for higher production and employment through the mechanism of an open market. To guard against the market disturbances resulting from the changes in investor preference or consumer preferences would require the disciplining of private enterprise with public controls of consumption, production, and income flows.

"There is no assurance that the guarantee of payroll tenure for individuals in their present jobs would work hand in hand with efforts to achieve 'full employment.' To achieve full employment presumes the opening up of new job opportunities in new or improved lines of endeavor. Indeed, a policy of encouraging the expansion of employment may find resistance in a program aimed at guaranteeing present persons in their present jobs. To protect a general pattern of wage guarantees would mean the placing of orders in the

(*Please turn to Page* 148)

Western Industry Promised Larger Supply of Steel

Productive capacity in West now exceeds prewar consumption. Finishing facilities are being increased and balanced

SAN FRANCISCO

WESTERN metalworking companies are promised an "eventual satisfactory supply of steel" as result of wartime and postwar additions to the area's productive capacity. This assurance was given last week by J. Lester Perry, president, Columbia Steel Co., United States Steel Corp. subsidiary, before the Purchasing Agents Association of Northern California.

In addition to the increased western facilities, expansion of steel plants on the Gulf and East Coast will provide West Coast manufacturers with enough steel and keen competition for years to come, Mr. Perry said.

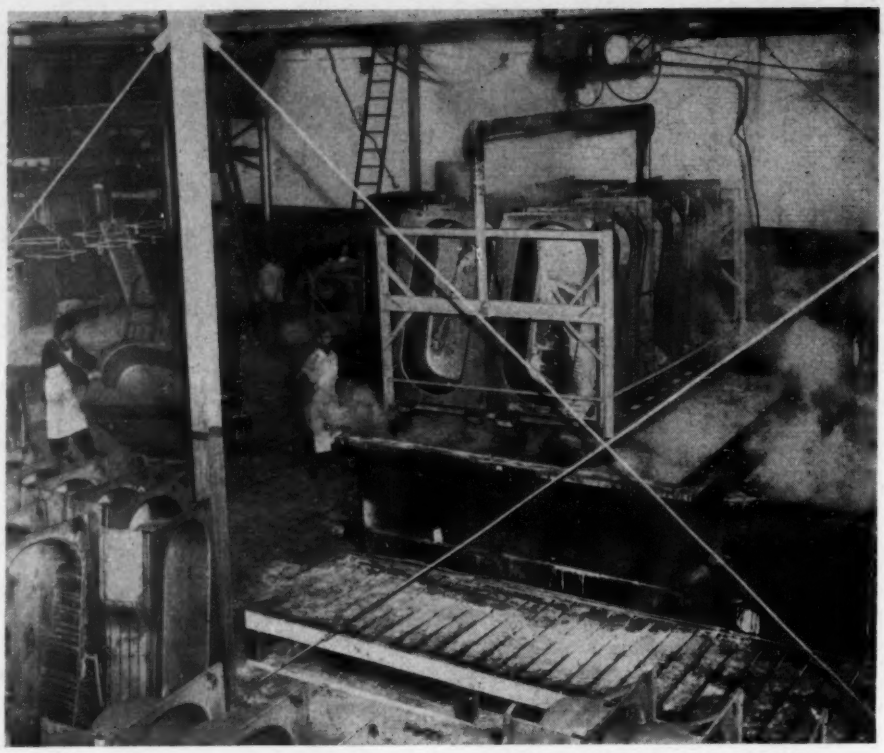
Before the war, capacity for producing finished steel west of the Rockies was about 900,000 tons a year, but at the same time estimated consumption in the western area was about 2,250,000 tons.

"Accordingly," Mr. Perry said, "it is apparent that before the war the local capacity could take care of about 40 per cent of the average prewar market and local consumers were dependent on eastern steel manufacturers for the rest.

War Expansions Triple Capacity

"During the war, expansion of steel production was rapid," he continued. "Two new plants, one at Geneva and the other at Fontana, were constructed and most of the existing plants were enlarged. As a result, there is now in the West the capacity to produce 2,700,000 tons of finished steel annually. It is true that the finishing facilities constructed for war production are not balanced to the peacetime market, but this is being remedied rapidly."

Mr. Perry then cited as examples of this postwar readjustment to peacetime needs the fact that Columbia Steel Co. is building a new 400,000 ton sheet and tin plate mill at Pittsburg, Calif., and soon will build a 300,000 ton sheet mill in the Los Angeles area.



Stamped steel bathtubs are readied for gas flame drying and baking operations in the enameling process at Norris Stamping & Mfg. Co., Los Angeles. New piping installations have permitted gas turn-ons in more than 500 Los Angeles industrial firms since the war

Natural Gas Gains as Fuel in Southern California; New Pipelines Raise Supply

LOS ANGELES

A TOTAL of 556 Los Angeles area industrial firms have received turn-ons following fuel gas piping installations since V-J Day. Of these, 178 are plants devoted exclusively to metalworking.

These figures were presented recently to the California Public Utilities Commission by F. M. Banks, vice president, Southern California Gas Co.

Mr. Banks called attention to the fact that fuel oil and gas are the only fuels used by industry in this area. No coal, except in the form of coke, is utilized for primary firings.

Referring to his company's new "biggest inch" pipeline from El Paso, Tex., which will begin carrying gas from that source into southern California by the end of this year, Mr. Banks said that the line's ultimate capacity of 305,000,000 cu ft of gas daily will be augmented from natural gas pools, mostly south of Fresno, Calif., which will yield an estimated additional 500,000,000 cu ft a day. These resources, he declared, assure ample fuels for years to come to southern as well as northern California industries.

Comparing gas with coal and oil as fuels, he pointed out that from the standpoint of heat delivered on a cost basis, oil will average 33 cents per million Btu, coal (on the average price of $20 a ton) will average about 80 cents per million Btu, while gas costs will average throughout a range of from 24 to 40 cents per million Btu.

Main factors in the use of gas, Mr. Banks testified, may be lumped under the heads of ease of transportation and feeding and lack of necessity for expensive storage equipment.

Sources of gas in the Los Angeles area may be regarded as inexhaustible, said Mr. Banks. While in times past fuel oil has had to be kept available for turn-on during peak demand seasons, this factor has in the main been eradicated through the opening of new fields in the region and by the laying of the Texas-California line.

In future, industry in general will be safe in providing for only 1 per cent of standby fuel oil burning, a negligible factor, he declared. In the past, during cold weather, when domestic consumers were given gas priority, industry found it necessary to turn to oil at these peaks of demand.

Halting of Tool Sales by WAA Viewed Optimistically by Trade

Dealers see some adjustments necessary, but say action will ultimately be to their advantage. Show stimulates business in both new and used tool markets, with buyers recognizing the need for up-to-date machinery

CLEVELAND

SOMEWHAT overshadowed by the flood of stories concerning new tools demonstrated at the Machine Tool Show in Chicago was the recent announcement by War Assets Administration in Washington that all surplus tools are to be screened by the Joint Army-Navy Machine Tool Committee before any are again offered for sale.

Under the JANMAT program which is stockpiling tools as a "reserve against a national emergency," a maximum of 92,000 of the remaining inventory of 126,000 tools may be withdrawn from the market. According to a Washington WAA official there will be few tools left for public sale after the services locate their requirements except "over-age, obsolete and special-purpose machines."

Regard Change as Boon

Locally, some dealers regard the WAA move as a boon to them. Since the announcement of the action, a number of dealers whose bulk of sales over the past two years has been of war surplus equipment are now establishing new contacts and within the past week have sold more privately owned tools than they had for some time previously. Furthermore, they regard sales of this type of equipment more easy to consummate than those of WAA tools, because they can establish their own prices instead of selling at WAA-established prices, made in some cases, in their opinion, without true knowledge of marketing conditions.

John J. Katzenmeyer, chairman, machine tool dealers advisory committee to WAA's regional office, says the agency's action undoubtedly will mean the demise of some businesses whose managers are interested in "making a fast dollar" and when surpluses are gone will drop out of the machinery picture. Elimination of this segment of the trade should limit the field to dealers who are thinking beyond immediate sales and whose livelihood depends upon rendering good service and maintaining a dependable source of good machinery for users over an extended period.

The machine tool show has acted as a stimulant to used machinery sales as well as to new ones. Part of this impetus is psychological and stems from the interest in machine tools aroused by the show. Most of the larger volume of sales traceable more or less directly to the show, however, is the result of hard-headed realism. Prospective buyers in many cases after visiting the show have realized that new tools are beyond their budgetary consideration but now know that to compete they must replace obsolete equipment with newer models. This class of buyer is developing into a large market for used tools.

Some 35 Firms Take Part In Independent Tool Show

Some 35 manufacturers and distributors held a Production & Machine Tool Show in the International Amphitheatre, 42nd and Halstead, Chicago, for ten days ended Sept. 26.

Exhibitors included: Ammco Tools Inc., Chicago; Anthony Tool Co., San Antonio, Tex.; R. E. Baur, Chicago; Beverly Shear Mfg. Co., Chicago; Boyar-Schultz Corp., Chicago; George H. Bullard Co. Inc., Westboro, Mass.; Canedy-Otto Mfg. Co., Chicago Heights, Ill.; Cosa Corp., New York; Crystal Lake Grinders, Crystal Lake, Ill.

DCMT Sales Corp., Div. British Industries Corp., New York; Davos Products Co.; Diamond Machine Tool Co., Los Angeles; DoAll Co., Des Plaines, Ill.; Dorst Bros. Mfg. Co.; Famco Machine Co., Racine, Wis.; Grob Bros., Grafton, Wis.; Harvey Lee & Sons, Chicago; Hobart Bros., Troy, O.; Hy-Air Products Co., Jackson, Mich.; Johnson Machine & Press Corp., Elkhart, Ind.

Logan Engineering Co., Chicago; Marvel Engineering Co., Chicago; Mead Specialties Co., Chicago; Merrion Tool Eng. Co.; Metal Removal Co.; Milwaukee Tool & Die Co., Milwaukee; Northwestern Tool & Eng. Co., Dayton, O.; Peterson Welding Laboratories, Kansas City, Mo.; Republic Drill & Tool Co., Chicago; Reynolds Tool Supply Co.; H. B. Rouse & Co. Inc., Chicago: Service Machine Co., Chicago; Sheldon Machine Co. Inc., Chicago.

The show was open on the same days as the one held by the National Machine Tool Builders' Association in the Dodge-Chicago plant (see p. 76).

NEW PATENT COMMISSIONER: Lawrence C. Kingsland (left) is sworn in as commissioner of patents by Secretary of Commerce W. Averell Harriman in ceremonies at the Commerce Department. NEA photo

Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

Congress to take up revision of Fair Labor Standards Act in January. Subcommittee to start drafting new bill next month to eliminate unwarranted interference with industry. No increase in minimum wage rates expected

LONG-NEEDED revision in the Fair Labor Standards Act will come up for consideration in Congress next January when the House Committee on Education & Labor will submit a bill aimed at correcting some of the inequities arising under the present law. A subcommittee headed by Rep. Samuel K. McConnell (Rep., Pa.) will begin studying revisions to be incorporated in the new bill next month.

The subcommittee is expected to decide against recommending an increase in the present 40-cent minimum wage rate.

The subcommittee now is considering a list of witnesses to be called for hearings on these matters, but a large part of the record was compiled during the hearings of last June. On the matter of an increase in the minimum wage, several subcommittee members expressed themselves at the time as fearing inflationary effects from such a move.

AFL Gives Vague Testimony

A witness who helped shape sentiment against the proposal was one of the legislative representatives of the American Federation of Labor who refused to give a clear-cut answer to the question of whether organized labor would seize on an increase in the minimum wage rate as a bargaining weapon with which to get wage increases all along the line. The AFL witness said his organization wants to do its own wage bargaining, but wants a higher minimum wage for two reasons: To protect unorganized workers, and to protect industry against wage cuts by employers.

The June transcript contains many instances of unwarranted interference with industry through the working of the Fair Labor Standards Act. Some of the stories, in brief, were as follows:

By James L. Newbold, American Retail Coal Association—Despite numerous assurances that it was not the intent of Congress to cover retail and service establishments, the Wage-Hour administrator applied the act to 5 to 7 per cent of the country's large city coal dealers. But all other dealers are under the necessity of constantly studying the complicated regulations and court decisions to determine whether they too, from time to time, may come under the act. A coal dealer has to know when he is delivering coal to companies engaged in interstate commerce. In delivering coal to a loft building he must know—at his peril—

SAMUEL K. McCONNELL

whether 20 per cent or more of the space in the building is occupied by tenants engaged in interstate commerce.

By Stanley I. Posner, Linen Supply Association of America—If a laundry supplies towels to be used in washrooms of banks or insurance companies it may be subject to the act. But it is not subject to the act when supplying the same towels to department stores and other establishments not classed as engaged in interstate commerce. As a result, laundries have to be careful in selecting customers so as to avoid the danger of bankruptcy from retroactive overtime wage suits.

By William T. Jobe, National Association of Ice Industries—Ice companies usually have three peak months in the year but it is the custom to pay a regular weekly wage throughout the year. Under the Wage-Hour Act, they would be forced to pay for time actually worked, which would mean hardship to the employees during the long off-peak periods. As a result of this situation, ice companies must refuse to serve customers in many instances who are in the interstate commerce category.

By John V. Lawrence, American Trucking Associations Inc. — All other forms of transportation are exempt from the Wage-Hour Act but this is not true of the trucking industry. Hardly a week goes by but what its members are confronted with formidable suits for back pay, for amounts which in many cases are greater than the net worth of the company. Trucks must start operating early and continue until late in the day and the unions have recognized this situation by contracting for work-weeks of 48 to 50 hours.

Says Russia Lags Industrially

In the opinion of Ernest C. Ropes, retiring chief of the Commerce Department's Russian Trade Division, heavy industry in the USSR is lagging so far behind American industry that the United States has nothing to fear from the Russians for the next 25 years. "They have been coming to us for know-how for the past 30 years," he said at his press conference, "and still are far behind our industrial production standards."

At least three more consecutive 5-year plans will be needed to bring Russian steel output up to two-thirds of America's production, said Mr. Ropes. Soviet mining has depended almost exclusively on equipment from the United States, and that now in use is old and obsolete. Russian unwillingness to enter into a trade arrangement with the United States, he said, is due to the fact the Russians have very little production to spare for export.

In only three fields of endeavor do the Russians excel; in meteorology, forestry and soil culture they are ahead of us, said Mr. Ropes. Mr. Ropes will retire at the end of September after 24 years as a Russian trade expert.

Pentagon Defense Headquarters

Sign of the times in Washington is the way operators at the Pentagon building now answer the telephone. Instead of "This is War Department," they now say "This is National Defense." The Pentagon building number continues unchanged at REpublic 6700. It will serve the Secretary of Defense, the National Security Council, the National Resources Board, the Army, and the Air Forces. The change dates from Sept. 22 following the swearing in of James W. Forrestal, former secretary of the Navy, as secretary of Defense, and the

The problems involved in grinding holes in the end of a shaft often make production men lead a dog's life. Now, with the Bryant No. 112-M these problems are solved quickly and accurately. This machine is designed to finish bores up to 9 inches deep in the end of parts such as machine tool spindles, arbors, shafts, etc. The work table is arranged so that parts may be held either in the hollow work spindle and steadyrest or in a special fixture so that a spindle can be ground on its own bearings. The workhead and steadyrest have longitudinal adjustment and can be swung for grinding standard tapers (Brown & Sharpe, MMS, Morse, Jarno, etc.) up to 30° included angle. Reverse tapers up to 10° included angle can be ground.

The wheelhead can be either belt driven (standard) or direct drive for high wheel speeds.

To facilitate loading and gaging, the wheelhead moves 8" to the rear. This same roller bearing slide provides cross-feed for sizing. The workhead (with 16" diameter swing) and the wheelhead are precision ball bearing construction. The axial wheelhead slide is a hardened steel bar riding on pressure lubricated bearings.

The controls include: variable speed in workhead by hydraulic motor 100 to 1,000 r.p.m.; variable rate for work and truing traverse; power cross-feed with variable rate; calibrated depth stop for facing operations; quick set reversing dogs to control position and length of wheelhead traverse.

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Write for the new Bryant No. 112-M catalog sheet which gives complete details.

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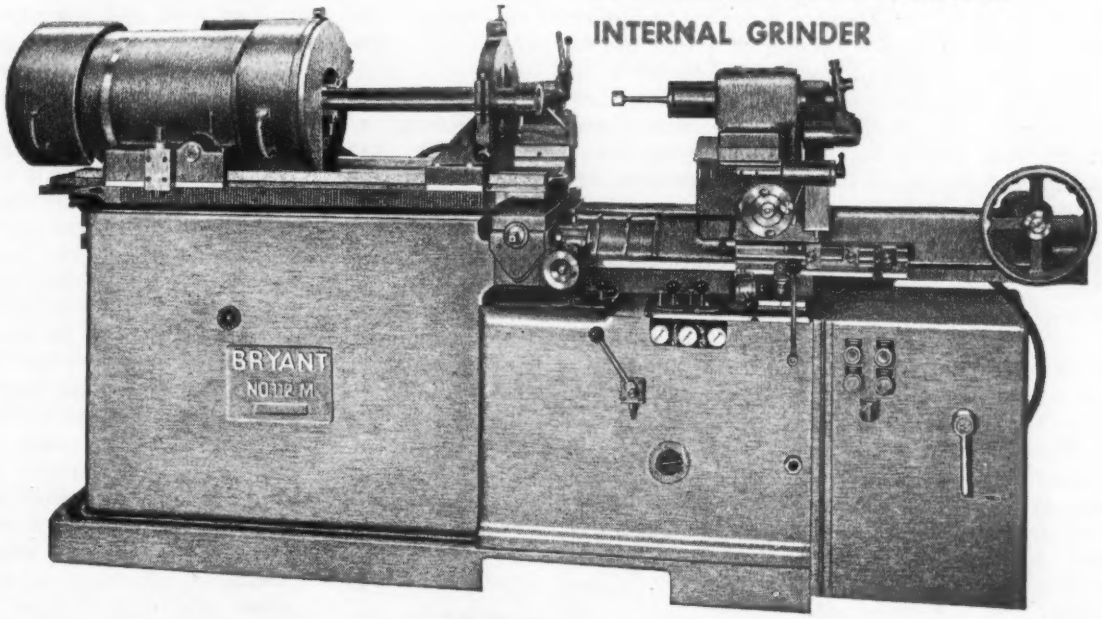

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BRYANT

High-ranking Army, Navy and government officials witness the swearing in of James Forrestal (hand raised) as the nation's first secretary of defense. Chief Justice Fred M. Vinson administers the oath of office. Others are, left to right: Sidney W. Souers, executive secretary of the National Security Council; Rear Adm. Roscoe H. Hillenkoetter, USN, director of the central intelligence agency; Secretary of Army Kenneth C. Royall; General of the Army Dwight D. Eisenhower, Army chief of staff; Secretary of Navy John L. Sullivan; Fleet Admiral Chester W. Nimitz, chief of naval operations; Secretary of Air Stuart Symington; Gen. Carl Spaatz, commanding general, Army Air Forces; Maj. Gen. Alfred M. Gruenther, director of the joint staff under the joint chiefs of staff; Thomas J. Hargrave, chairman of the munitions boards; Gen. Alexander A. Vandergrift, commandant of the U. S. Marine Corps. NEA photo

induction of John L. Sullivan as secretary of the Navy, W. Stuart Symington as secretary of the Air Force, and Kenneth C. Royall as secretary of the Army. The changes, on radioed orders from President Truman, were made sooner than originally expected due to recent deterioration in the international situation.

Map Research Schedule

In formulating its research work schedule for fiscal 1948, the Metallurgy Division, National Bureau of Standards, has been hampered by personnel difficulties. Men who served in key spots beyond the retirement age during the war period had to be replaced. In addition, there have been difficulties in obtaining permanent civil service status for employees hired during the war. Of the Metallurgy Division's technical staff of 70, the tenure of 16 still is uncertain.

Many of the current programs represent resumption of work that was interrupted by the war, according to the division chief, Dr. John G. Thompson. But all of them are aimed, at least in part, at developing basic information whose lack was felt during the war. A number of the programs are sponsored by government agencies. Only one, concerned with underground corrosion of cast iron pipe, is sponsored by a private organization—the Cast Iron Pipe Research Association. Other privately sponsored programs that were halted by the war, may be re-established later on.

Main programs to be worked on in the Metallurgy Division during the current fiscal year are:

A complete revision of the 162-page circular on "Nickel and its Alloys" printed in 1924. The new book will be at least 50 per cent larger and will contain much additional information, particularly on nickel in stainless and heat-resistant steels.

A study of the effect of boron on the hardenability of steel. The question to be answered is: Where does the boron go, and why does it produce results?

A further study of the mechanical properties of metal at low temperatures—down to and including that of liquid air, at minus 188 degrees C.

Continuation of the study of creep strengths of metals at elevated temperatures. In particular, a start was made on design and construction of an instrument to measure hardness of metals at high temperatures.

A study of the mechanism of fatigue failure. The objective is to develop a technique of detecting fatigue failure while still in the incipient stage and before it has progressed to the stage of substantial structural failure.

Certain phases of atomic energy research.

A continuation of the bureau's 20-year-old program to measure the quantities of oxygen, hydrogen and nitrogen in steel and to determine their effects. This is part of a broad study aimed at producing pure iron and at a determination of the properties of pure iron, and also at a better understanding of the effects of additions.

Studies in the field of powder metallurgy. The current phase is an approach on the standardization of tests of metal powder. As a starter the bureau has just completed a list of all patents in this field, numbering 2253. Published July 1, 1947, it is entitled "United States Patents on Powder Metallurgy" and copies may be had from the Superintendent of Documents under the designation NBS Miscellaneous Publication No. M-184.

A continuation of the study of laboratory methods for testing foundry molding sand. This is in co-operation with the American Foundrymen's Association and the American Society for Testing Materials.

Following the recent development of a procedure for producing magnesium castings in the bureau's experimental foundry, the Metallurgy Division is embarking on a study of magnesium alloy castings.

Publication of a paper, now being written, on the effects of alloying elements on the transverse properties of cast iron bars. The paper will include results of recent experiments on the effects of boron additions.

Publication of a critical review, now nearing completion, of the literature on the controversial subject of hydrogen embrittlement of steel. This task originated in a request from the National Advisory Committee for Aeronautics.

Demand for Industrial Trucks Brisk

Increased labor costs, experience gained during war makes selling job easier. Industry now operating at highest peacetime level

By VANCE BELL
Associate Editor, STEEL

WAR-SHARPENED consciousness of materials handling costs is counted on by producers of powered industrial trucks to sell a substantial volume of orders now that labor rates have reached a record high level.

Not only are the producers of powered industrial trucks favored with such a stimulant to sales but the stimulant comes at a time when peacetime industrial production is at an all-time high—a time when there's a huge tonnage of materials to be moved.

Except for one or two peak war years, the powered industrial truck industry is now operating at the highest rate in history. Before the war, the materials handling equipment industry was comparatively small. Tremendous demand by both the Army and the Navy for powered industrial trucks caused production in most plants to rise to unprecedented heights. In addition, there were heavy requirements industrially and commercially for such equipment to move materiel to the armed forces.

The number of people who saw industrial fork trucks and tractors and who were associated with them directly, or were cognizant of the results of their use during the war, spread the knowledge concerning this particular type of materials handling far and wide. As a result, the demand now for this type of equipment far exceeds that of the prewar period.

Acceptance Now Widespread

As a consequence of the war-time popularization of powered industrial trucks, manufacturers now note a vast difference in the attitude with which they are accepted. Says D. L. Darnell, vice president in charge of sales, the Baker-Raulang Co., Cleveland: "We no longer have to sell the idea of handling material with an industrial truck. People with material to handle expect to use industrial trucks and all we have to do is to convince them that we are building a good machine. As a result of this acceptance we can see indications that the postwar volume of the industrial truck industry is possibly five times what it was in the plateau between the two wars."

In similar vein, L. J. Kline, executive vice president, the Mercury Mfg. Co., Chicago, says, "there is no question but that the acceptance by the armed forces of the industrial power truck during the war years has given an impetus to the use of this type of machinery for peacetime operations. We find that we have many more prospects willing to listen to our sales story now than was the case prior to 1940. It is our opinion that industrial truck equipment as an industry will maintain a volume of business at least double that which was enjoyed prior to the war."

With labor costs now at a high point, industry is intensifying its efforts to find ways of cutting overall production costs, and one area that is getting exceptionally close attention is that of materials handling. A glance at wage trends in manufacturing industry reveals quickly that inefficient handling of materials can be costly. Figures of the U. S. Department of Labor show that whereas average hourly earnings of all manufacturing industry in 1939 were 63.3 cents they had risen to $1.23 in July, 1947. The upward trend is shown by the following figures:

	Cents		Cents
1939 average ..	63.3	Mar., 1947	118.0
Jan., 1941	68.3	Apr., 1947	118.6
June, 1946	108.4	May., 1947	120.8
Jan., 1947	116.1	June, 1947	122.7
Feb., 1947	117.0	July, 1947	123.4

Not only is industry interested in the use of materials handling equipment as a labor saver but there are instances where labor unions are insisting that the health and safety of workers be guarded through the provision of machinery for doing heavy, back-breaking jobs.

Shortages and unbalances in the flow of materials and components have been hampering makers of powered industrial trucks, just as is the case with most other manufacturers. However, there appears to have been progressive improvement in materials and supplies as is evidenced by the following figures on units of electric industrial trucks and tractors shipped over a 17-month period:

	1946	1947		1946	1947
January ..	146	320	July	258	...
February ..	148	273	August	265	...
March	154	320	September .	229	...
April	219	420	October ...	311	...
May	266	349	November .	276	...
June	273	...	December..	330	...

Concerning materials supplies, the Mercury Mfg. Co. says it is experiencing no critical shortages. However, it finds the labor supply, particularly skilled types, continuing in short supply. The company, a manufacturer of industrial lift and fork trucks together with gas and electric tractors and industrial trailers, finds that its business for the last two years has been running better than 100 per cent greater than the base years of 1935-1939. Its backlog in the last two years has not diminished appreciably. Shipping promises recently have varied from four to six months.

The supply problem is a perplexing and costly one with Towmotor Corp., Cleveland. Most critical item is engines, with steel ranking next. Increased materials costs and premiums paid for various supplies to keep production progressing have added substantially to the company's costs. Complicating production problems considerably is the necessity to spend considerable time and effort to expedite delivery of materials to its plant. Towmotor has been able to keep production near the wartime peak through this effort, says C. E. Smith, executive vice president. The company has been able to whittle down its backlog of orders so that deliveries of industrial trucks have been cut from 20 weeks to eight to ten weeks. With backlogs pretty well reduced, the company is depending largely now on its incoming orders, which are being received in substantial volume. In addition to domestic requirements, exports have added materially to Towmotor's business.

Strong Demand Continues

Elwell-Parker Electric Co., Cleveland, has a big backlog of orders for industrial trucks and sees continuance of a strong demand for labor-saving equipment. Even abroad the need is great for increased mechanization and foreign demand alone could absorb all of the Elwell-Parker output of industrial trucks.

Difficulties in obtaining supplies are holding down production at Elwell-Parker. Deliveries on various parts are running from four to six months. Particularly in short supply are malleable castings and gears, C. B. Cook, vice president, reports.

Continually rising labor costs in industry have brought about a growth in the capacity and size of industrial trucks produced by Elwell-Parker. As capacity of the trucks has risen the size of them has increased,

making the job of assembling them an increasingly greater one.

The Crescent Truck Co., Lebanon, Pa., is experiencing a shortage of materials. C. D. Eiler, president of the company, comments, "We have been able, however, to maintain a fairly close delivery. Therefore our backlog covers only a period of approximately 90 days, but it consists entirely of firm, legitimate orders." The Crescent company has been operating at about 60 per cent of its peak wartime capacity, which is several times greater than its volume in prewar years.

At Automatic Transportation Co., Chicago, order backlogs are slightly lower than they were in 1946 but still are sufficiently high to keep manufacturing operations at the highest rate in the company's history. Furthermore, Elmer F. Twyman, general manager of the company, is of the opinion that demand for electric industrial trucks will continue high for an indefinite number of years. Presently, the company is not particularly handicapped by shortages of materials, although from time to time steel and copper present something of a problem, according to Mr. Twyman.

Materials Problems Serious

With the General Equipment Co., Portland, Oreg., the imbalance of materials has been of more serious proportions. Early in the first quarter of 1943 that company reached a production peak, which really was beyond the plant's capacity but which was made possible by subcontracting a considerable volume of work. Immediately after the war, General Equipment increased its capacity considerably, and while the war-time rate of production was maintained, all of the work was done in its own plant. However, by Dec. 1, 1946, the company's inventory of material and components had become so badly unbalanced and the prospects of obtaining sufficient sheet steel and roller chain were so dim the company cut its production to within line of expected supply of those two items. This amounted to a production cut of about one-third. That reduced rate prevailed until recently when the company anticipated a gradual increase with the view of having output up to or slightly above the former rate by about the first of 1948.

Items on which the customary delivery time ranged from eight to 18 months were recently being delivered in from two to four months, General Equipment reported. Ball bearings and automotive accessories, such as starters, generators, and carburetors, are still not in plentiful supply, but the delivery situation on them is much improved over a year ago, said General Equipment.

Labor for unskilled jobs is plentiful but the quality is extremely low, General Equipment has found. Skilled foundry labor is almost impossible to obtain in the company's area. The same is true to only a slightly less extent with regard to skilled machine shop labor. However, reasonably good automotive-type mechanics are in somewhat more plentiful supply.

General Equipment's order backlogs have decreased considerably as shown by the fact that a year ago deliveries were running 90 days or more, whereas lately they have been approximately 30 days. However, with greater sales efforts the company is having no trouble keeping sales slightly ahead of production.

Lewis-Shepard Products Inc., Watertown, Mass., reports operations continuing equal to its best years. However, about 20 per cent of its production is being devoted to reducing its order backlog. As the company makes seven different products, the backlog varies per product, but overall backlog is about six weeks. As to the future, the company expects demand to be good, says A. L. Lewis, president. Materials supplies, said the company, have been improving and are quite satisfactory except for electrical equipment. Also loosening is the labor supply, permitting employment of better men, with a consequent reduction of production costs.

Improved Deliveries Expected

At Chicago, the Barrett-Cravens Co. has been cutting its order backlogs to a point where considerably improved deliveries are in view. However, the company, according to E. J. Heimer, president, has been handicapped by shortages of materials and components, such as motors, roller chain, and pipe. The company has had a tremendous inventory but it has been unbalanced, with a result production has not been as high as its facilities and manpower would permit under more favorable conditions.

Lift Trucks Inc., Cincinnati, reports demand for a new type truck it is producing has presented big problems in materials supply and plant expansion. Walter C. Stuebing, president, says difficulties include delays in obtaining electrical equipment, such as controllers, motors and batteries.

Optimistic as to the future is Truck-Man Inc., Jackson, Mich. The company has seen distribution of its product spread from territory immediately around its factory to almost every state in the United States. With further mechanization of materials handling in prospect in industry, the company sees a fertile sales field ahead.

Experiments Successful in Burning Underground Coal

Experiments in underground gasification of coal in place are termed successful in a recently released report by the Bureau of Mines, Department of the Interior, which describes tests conducted jointly by the bureau and the Alabama Power Co. at Gorgas, Ala.

Dr. Arno C. Fieldner, director of the bureau's fuel and explosives branch, said the experiment was only a "first step," and that much additional research must be made.

A statement of the bureau said, however, that all of the primary and secondary objectives of the experiment were achieved. The 50-day project determined that coal in place "could be burned successfully and that the burning could be controlled."

Pittsburgh Makes Plans for X-Ray Diffraction Meeting

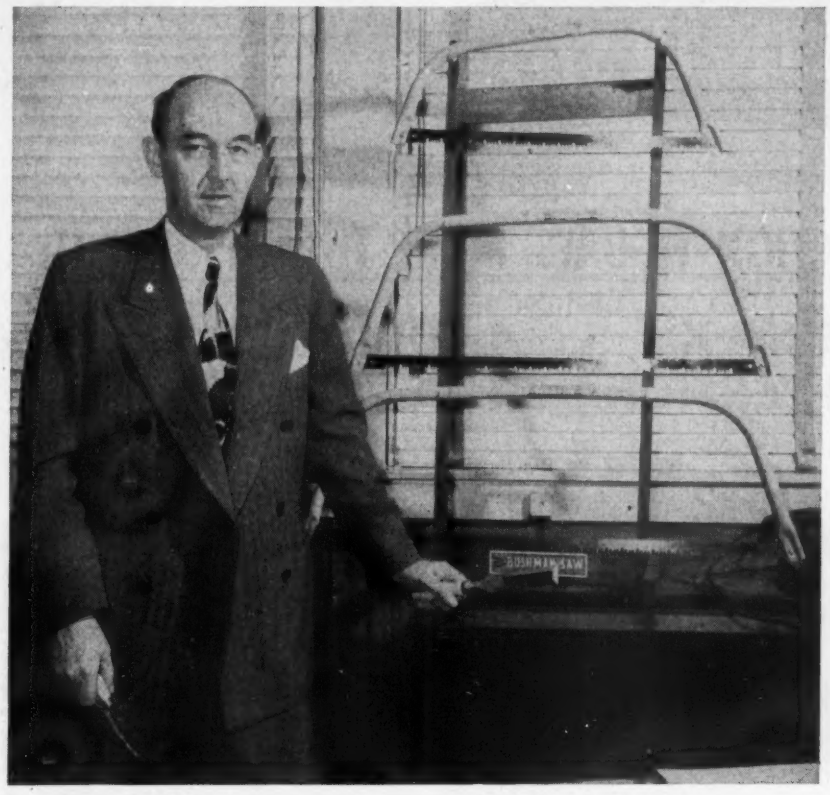
The fifth annual Pittsburgh conference on x-ray and electron diffraction will be held Nov. 7 and 8 at the Mellon Institute in Pittsburgh.

Guest speaker at the conference will be Sterling B. Hendricks, principal chemist for the Department of Agriculture, who will talk on "Crystal Structure and Lattice Termination in Clays and Related Products." Also featured at the meeting will be a symposium on interstitial compounds, an examination of x-ray and electron diffraction studies at high temperatures, a symposium on lattice imperfections, and a symposium on Geiger-counter x-ray spectrometer studies.

Pullman-Standard's Output Rises in First Half of 1947

Output of Pullman-Standard Car Mfg. Co. in the first half of 1947 more than doubled, in dollar value, the output in the first half of 1946, according to a recently released financial report of Pullman Inc., holding company for the Chicago firm.

Shortages and unbalance in the supply of rolled steel and other component parts, particularly in the first quarter, however, prevented Pullman-Standard's production of the number of cars scheduled, the report states.



SCANDINAVIAN PRODUCTS: Y. A. Hogsten, vice president of General Steel Warehouse Co., Chicago, displays a few of the products the company is importing from Sweden and Finland for sale here. Mr. Hogsten has just returned from a buying trip to the Scandinavian countries

Operations of German Metalworking Plants Limited to 30% of Capacity by Lack of Steel

DUSSELDORF, GERMANY

IF PRODUCTION of consumers goods, including agricultural equipment, is to be increased materially in the Ruhr, larger allocations of steel must be made.

Processing and fabricating plants in these fields are currently able to operate at only 30 per cent of capacity on the basis of the 135,000 tons of steel which were made available to them in the second quarter. Shortage of coal, however, prevents attainment of even this low rate of operation, and completion of consumers goods is slowed accordingly. Increased production in all metalworking industries is seen possible only by a complete overhaul of the German steel industry, both technically and financially.

The process of de-concentrating the steel industry is having an adverse effect on production. As of August, twelve independent companies had been set up and although these account for about half of the Ruhr's steel output, they are encountering severe financial and technical difficulties, and a number of them have expressed the desire to remain within their former technical operating structures to avoid unnecessary expenses and waste of heat and coal.

Impressive losses continue to be incurred each month by all steelworks in the Ruhr. During the six months from October, 1946, to March, 1947, monthly sales by steel plants of 45.8 million marks resulted in monthly losses of 17.7 million marks, according to the custodian office. Reasons for these excessive losses were determined to be as follows: Use of low-grade domestic ores (no imported ores were available); lack of plant repairs; low efficiency of workers, the result of lack of food; lack of fuel; and inability to maintain steady production for all the above reasons.

Wide discrepancies in accounting figures, some as a result of the separation and establishment of independent companies, compound the problem of determining operating costs and arriving at profit and loss figures. Consumption of various raw materials also varies widely from month to month, making schedule planning close to impossible. Cost of producing one ton of open-hearth steel differs as widely as 92.63 marks per ton to 269.82 marks, and processing expenses differ as widely as 14.76 to 61.21 marks per ton.

Stabilized costs might be achieved if production could be expanded to near-capacity levels. But in the case of the first four independent companies which were set up last spring, of their theoretical capacity of 2.3 million tons only 1 million tons are being produced annually now, with prospects of this output being cut because of insufficient supplies of fuel, electricity, refractory materials and other raw materials. These four companies—Oberhause, Hoerde, Haspe and Bochum—would also have to invest 72.2 million marks to make attainment of full production possible. Of this total 21.3 million would go for new construction, 29.2 million for deferred maintenance, and 21.7 million for reconstruction.

The problem of steel prices is still held in abeyance. There is talk that a 44 mark advance will be granted, 22 marks of which will be passed on to consumers, the other 22 marks to be added to the present subsidy of 50 marks.

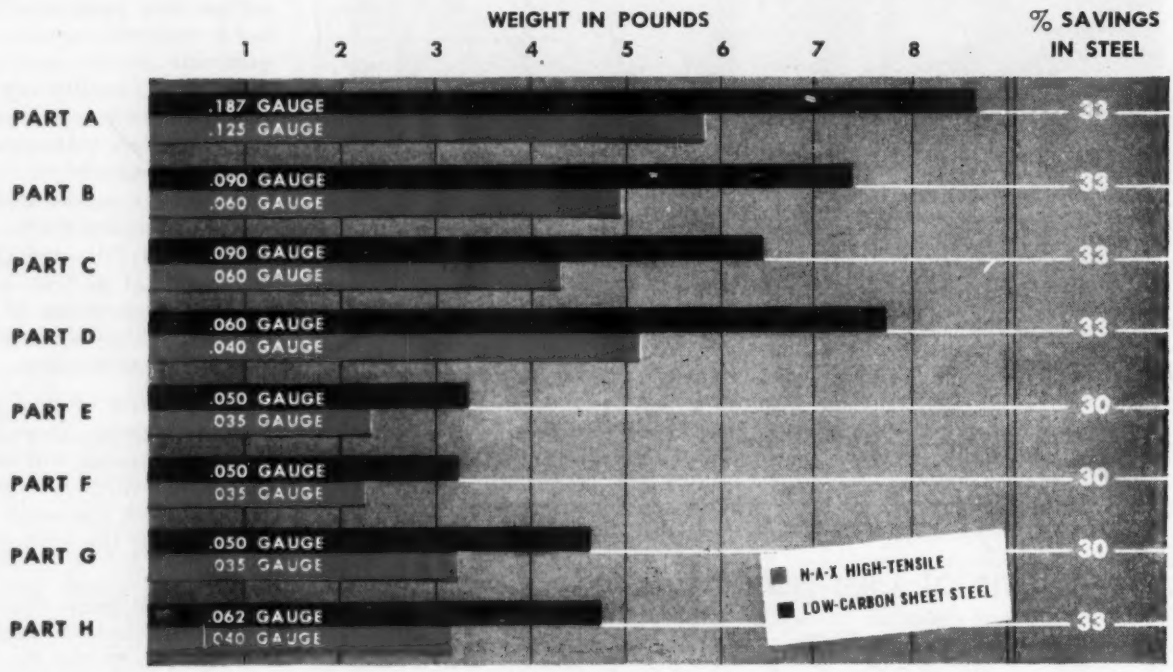
The whole price structure in Germany seems badly in need of thorough overhauling. In the field of exports, particularly, there is little incentive for the recovery of German trade. The German exporter can charge only the ceiling prices which were fixed about ten years ago; a foreign customer has to pay the respective world market price in dollars. The exporter gets no share of the higher dollar prices, and instead of wanting to sell abroad, he prefers to make domestic sales where he is able to barter for urgently needed materials, notably food stuffs.

Steel producers are hoping for quick settlement of other problems to bring the current period of uncertainty to a conclusion. These interests would like to see the remaining 13 to 18 independent companies set up this fall and lease contracts terminated. All stock in the new companies is held by the custodian office, which assumes the role of a gigantic public holding company. Who will eventually get the shares has not yet been determined, and the problem of interesting foreign capital in the plants appears involved in this question.

THE NEW ARITHMETIC IN STEEL

ACTUAL PRODUCTION FIGURES MORE THAN PROVE IT:

3 TONS N-A-X HIGH-TENSILE > 4 TONS CARBON SHEET STEEL



We have claimed that N-A-X HIGH-TENSILE can effect a 25% saving in steel. This graph shows the results when one leading manufacturer switched from carbon steel sheets to N-A-X HIGH-TENSILE . . . utilized thinner sections with no sacrifice of strength . . . and saved up to 33% in steel.

The change was made because of the unique combination of properties of N-A-X HIGH-TENSILE. With its 50% higher physical properties, it has exceptional formability for a high-strength steel, and can be formed and drawn into intricate shapes with little or no change in dies or machinery adjustments. It has excellent weldability, great impact toughness, high fatigue- and corrosion-resistance. These qualities not only provide a more durable product, but often effect economies in fabricating and handling. Based on *over-all costs,* N-A-X HIGH-TENSILE compares favorably with carbon sheet steel.

Today's supply of N-A-X HIGH-TENSILE is insufficient to meet the demand, but we are looking forward to the day when we can fill your needs. When that time comes, our engineers and metallurgists will be glad to work with you to determine just how much steel you can save by using N-A-X HIGH-TENSILE.

MAKE A TON OF SHEET STEEL GO FARTHER
Specify—
N-A-X
HIGH-TENSILE STEEL

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By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Packard reveals 1948 "hard jobs" in three series of 8-cylinder models. Engines described as completely new and are designed for maximum interchangeability of parts. Prices range from $2125 to $4668, Detroit

DETROIT

PACKARD'S "hard jobs" were put through their paces last week for the press, right on the schedule sketched out by President George T. Christopher last March when the 1948 convertible model was unveiled. The "hard jobs"—meaning the conventional closed cars—include three series of 8-cylinder models identified as an eight, a super eight and a custom eight (automobile people would be hard put if they had to eliminate the words super, custom and deluxe from their vocabularies). The custom eight is powered by a 160-hp engine, with 356 cu in. displacement, the super eight by 145-hp with 327 cu in. displacement, and the eight by 130-hp with 288 cu in. displacement.

All three engines are described as completely new and are designed to have maximum interchangeability of parts, thereby lowering manufacturing costs appreciably and simplifying the service problem. Compression ratio has been stepped up to 7:1, as against 6.85:1, but premium fuel is not required. Crankshaft is larger and heavier, crankshaft sprocket is hardened steel and drives a new type of rollerpin timing chain. Connecting rod bearings are larger and main bearing area has been increased.

Changeover Began This Month

Changeover to the new line began early this month, marking the fruition of a $20 million program started at the end of the war. Already 3000 of the models have been shipped. As an example of typical costs involved on the three new lines, die sets for just the four doors totaled $600,000, while dies for the two front fenders on the custom job cost $300,000. Packard claims die costs have tripled or quadrupled since 1941.

Each of the three series is produced in a number of body types, basically what are termed club sedans, touring sedans, limousines and convertibles, plus one new design made only in the lowest-priced eight. The latter is called a station sedan, on the premise "it is just too fine a car" to be called a station wagon. It is of all-steel design, four-door six-passenger, with a rear compartment and tailgate accommodating 21 cu ft of luggage or parcels. About $1 million was spent on development and tooling for this one model alone. Over the door panels, around windows and over the tailgate are fastened hefty strips of hard wood, to lend the suburban touch desired in this type of automobile. Floor is of plywood over which are laid stainless strips to prevent marring of wood. Upholstery and interior trim are of vinyl plastic, all washable. The design carries a price of $3350, delivered Detroit.

On the score of prices, a few of the 1948 series are slightly lower than comparable 1947 types. Some remain the same and others are increased slightly. They fall in the full range from $2125 to $4668. To many buyers these may seem high price tags; however, it must be remembered the "price of newness," as Mr. Christopher calls it, is at an all-time peak. Every car built must carry its share of tooling writeoff, and for a comparatively small-volume producer like Packard, the figure runs high, just as it does with Studebaker and Kaiser-Frazer, whose current models reflect substantial tooling costs.

Overall Packard body lines, dubbed "free-flow styling," carry out those shown in the convertible. Fenders have all but disappeared into the lower body shell which flares out from the belt line and sweeps down over the wheels. A small insert shield is necessary over the rear wheels to permit changing them. The flare in the lower door makes it impossible to use conventional turn-type handles, so they are replaced by the push-pull design, as on the Kaiser-Frazer line. Packard uses both the so-called "fast" back and the "notched" back, apparently figuring, as does many another automobile company, that the public continues divided over which type is preferred, so both must be offered.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

Estimates by Ward's Automotive Reports

	1947	1946
January	373,872	126,082
February	399,717	84,109
March	441,793	140,738
April	449,388	248,108
May	390,629	247,620
June	418,919	216,637
July	396,932	331,100
August	360,221*	359,111
September		342,969
October		410,510
November		380,664
December		380,908
12 ms.		3,268,456

* Preliminary.

Estimates for week ended:

Sept. 6	83,444	72,535
Sept. 13	106,095	88,888
Sept. 20	110,088	80,826
Sept. 27	108,000	83,995

Steel Outlook Dark

Flat-rolled steel outlook continues dark in all directions, despite the fact the automotive industry is receiving more tonnage than it ever did in history. Sheet and strip are being chewed up at a record rate and the larger manufacturers with outlying assembly plants say it is now far less than the normal 30 days between the time sheet is received at a stamping plant and the time it emerges in the form of a finished car. Large buyers of steel are at a further disadvantage because of the fact mills can chop off a little of their tonnage and thereby satisfy a score or more of howling customers, leaving only the complaint of the single large buyer.

Another complicating factor has been the trend of many mills, evidenced over the past year or more, to draw in from territories beyond their home market, with the idea of avoiding excessive freight absorption often necessary by virtue of the multiple basing point system of pricing. Freight costs are up 25 per cent and are heading higher, so the centralization of steel mill shipments is probably just good business sense. Still, to a greater or lesser degree, it works hardships and causes a good deal of scurrying around for new steel supplies.

An example is the current two-

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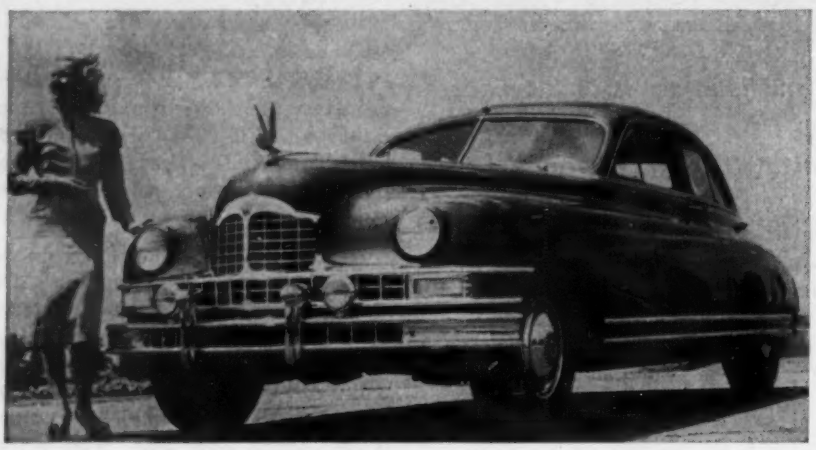


NEW PACKARD: Distinctively different radiator grille treatment and ornament sets apart the custom eight from the other two series of new 1948 Packard models. Shown here is the touring sedan, on 127-in. wheelbase, with 160-hp engine. Note the "free flow" body and fender lines

week shutdown at Cadillac, ascribed to lack of frames. The shortage develops ostensibly from a reduction in the steel intake at the plant of the frame supplier.

Hudson Next To Change Over

As reported here Sept. 15, Hudson will be the first manufacturer to effect a complete changeover to 1948 models, omitting Packard which has been making a gradual shift over the summer months. A radical departure from present designs is now going into production, with the 1947 production run terminated Sept. 19. First assemblies of the new series should be coming off lines about Oct. 15, although a number of parts have been in process for several weeks.

The company will spend approximately $16 million on retooling, involving a program unique in the company's 38-year history, over which period better than 3,000,000 cars have been built. The new Hudson will embody a changed type of construction, centered around a box-section integral-type body and frame which is built up separately and dropped on the wheel and power section. Overall height of the car is only 5 ft; floor level is 3 in. lower than at present. It will be the first car ever built in which passengers will "step down" to enter. Rear seat has been moved ahead of the rear wheels and lowered, allowing its width to be extended to 63 in., just about the widest ever built.

Automakers at Tool Show

As expected, swarms of Detroit engineers and master mechanics' crews descended on the Machine Tool Show in Chicago, many plants here sending production and planning teams in relays of two or three days each. They came back weary but impressed. The only remaining question is whether managements are going to see fit to approve expenditures of the large sums involved in modern machine tool equipment. Chances are they will to a certain extent.

One of the high spots of the show, as far as attracting attention was concerned, was the 45-ton ten-station Fellows rotary gear shaper machine, illustrated in STEEL for Sept. 22, p. 43. It was really a spectacular hunk of cast iron, steel and motors and was set up to finish 20 automobile timing gears every 2½ minutes. It was in no sense a standard machine, drawing grunts of "Rube Goldberg-ish" from some of the hard-bitten old-time machine men. It carried a price tag of $79,000, or close to $1 per pound, and according to talk around the show was built for installation at Buick in Flint. Doubtless many of the special machines on display at Chicago were built to order for some automotive plant and were due to be rushed this way for installation after the show closed. Plymouth, for example, was the reported buyer of the 50-ton crankshaft turn milling machine—another show highspot—capable of turning the six rod bearings of a crankshaft in 60 seconds as against a former 15 minutes or so. Its price was in the vicinity of $100,000.

A considerable volume of machine equipment will be required to handle the automatic transmission programs now in various stages of development. One of those furthest along is the Buick job, which will be called the Torq-matic transmission, and probably will be available on Buick Roadmaster models some time next year.

A similar type of transmission, developed by the White Motor Co., Cleveland, for use in busses, has been designed in smaller size for Studebaker, and shortly may be scheduled for production. The unit was described in detail by a White engineer at the annual S. A. E. meeting in January.

Toulmin Quits Tucker

Resignation of Col. H. A. Toulmin Jr. as chairman of the board of Tucker Corp. "because Preston Tucker would not agree to my written demands of the last two months that any money raised from the public should be spent and administered under the strictest regulation and controls normal to legitimate business," was followed by an immediate and hastily called press conference at which Tucker heatedly denied the charges.

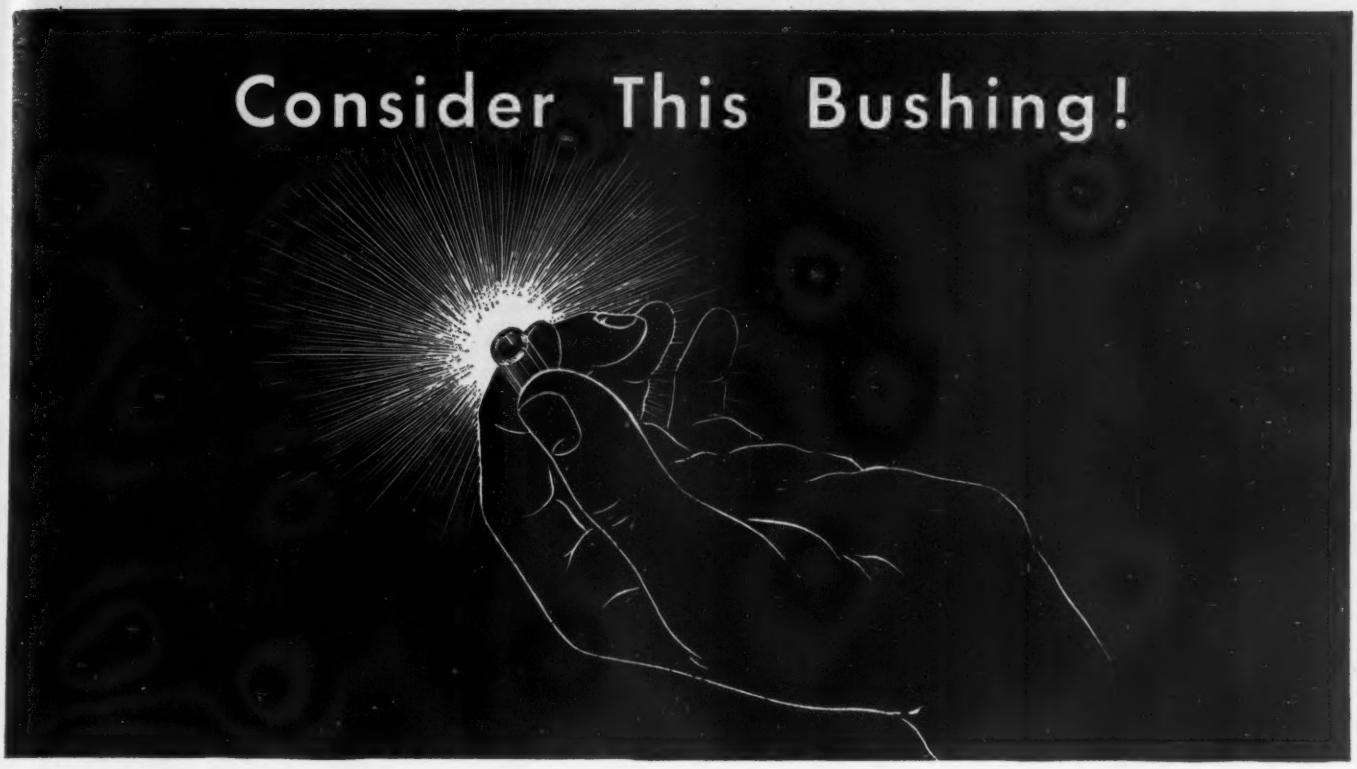
Col. Toulmin released his statement at a press conference, attended by one of Tucker's own men, who relayed details to his employer before the story could make the papers, whereupon Tucker countered with the "news" that Colonel Toulmin had resigned in protest against Tucker's asking him to make way for a man more prominent in the industry.

Privately, Colonel Toulmin told a somewhat spicier story about his experiences at Tucker Corp. Based on the colonel's long experience in patent law and industry, his remarks to the effect that one finished model of the Tucker "is far from workable and will take a great deal of engineering to make it so" carry considerable weight, particularly when stacked against Tucker's boast that his cars will be on the streets by Christmas, will sell for $1900, will be pouring out at the rate of 1000 a day by next August.

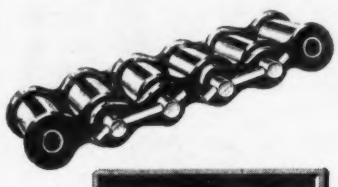
Upon the recommendation of Colonel Toulmin, the J. G. White Engineering Corp. was invited to survey the plans of the Tucker Corp. for engineering and production. When the preliminary report was submitted by the J. G. White Engineering Corp., which recommended a business-like organization and full technical controls of the various phases of the business, the report was summarily rejected by Tucker.

An interesting angle being talked around Detroit deals with the contribution of something like $250,000 which the UAW-CIO is said to have made to show its faith in the Tucker venture.

Consider This Bushing!



This short length of UNION roller chain is made up of the 28 separate parts shown below.



UNION CHAINS

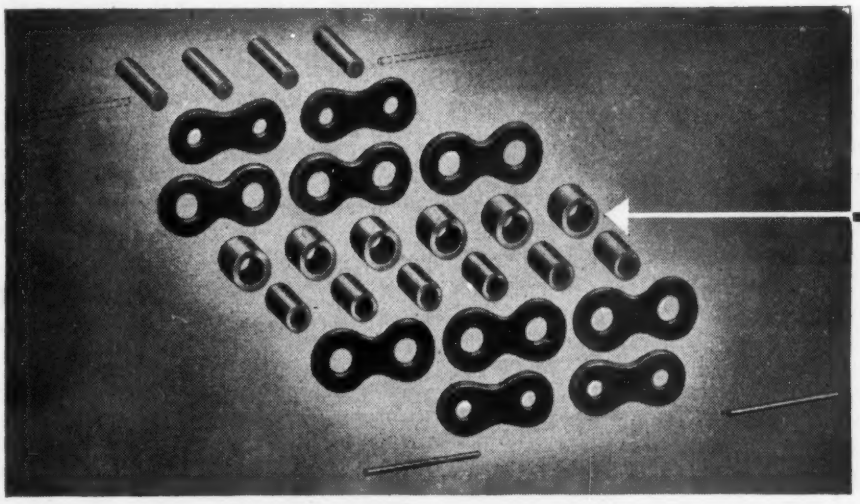
Held between your fingers, it seems delicate and of little consequence—yet its fabrication requires 10 distinct and precise operations. For this is a bushing for a UNION roller chain and it is built to withstand tremendous punishment.

For the short length of chain shown at the left, 6 of these steel bushings are needed. All told, in that same length of chain, there are 28 separate parts, as you can see in the "exploded" drawing below. To make these 28 parts a total of 290 operations is required . . . **all under rigidly controlled inspection.**

At UNION CHAIN, all our energies and skills are concentrated on the manufacture of sprocket chains, attachments and sprockets of various types for the transmission of power and the handling of materials.

We are not yet able to meet the tremendous demand for UNION chain, but we are making every effort to do so, consistent always with the character of our product and the complicated processes of its manufacture.

The Union Chain and Manufacturing Company • Sandusky, Ohio



THESE 10 OPERATIONS TO MAKE THIS STEEL BUSHING

1. straighten stock material
2. cut off to length
3. curl
4. roll
5. grind
6. de-grease
7. carburize and quench
8. re-heat to refine core structure
9. draw to relieve internal stress
10. clean and polish

Report Progress In Fight Against Mounting Costs

Showing of Monroe Auto Equipment Co. illustrative of management's successful reconversion efforts in past year

SUBSTANTIAL progress in the battle against rising production costs and other difficulties incident to complete adjustment to postwar conditions is reflected in the metalworking industry by the achievements of numerous metalworking firms over the past year.

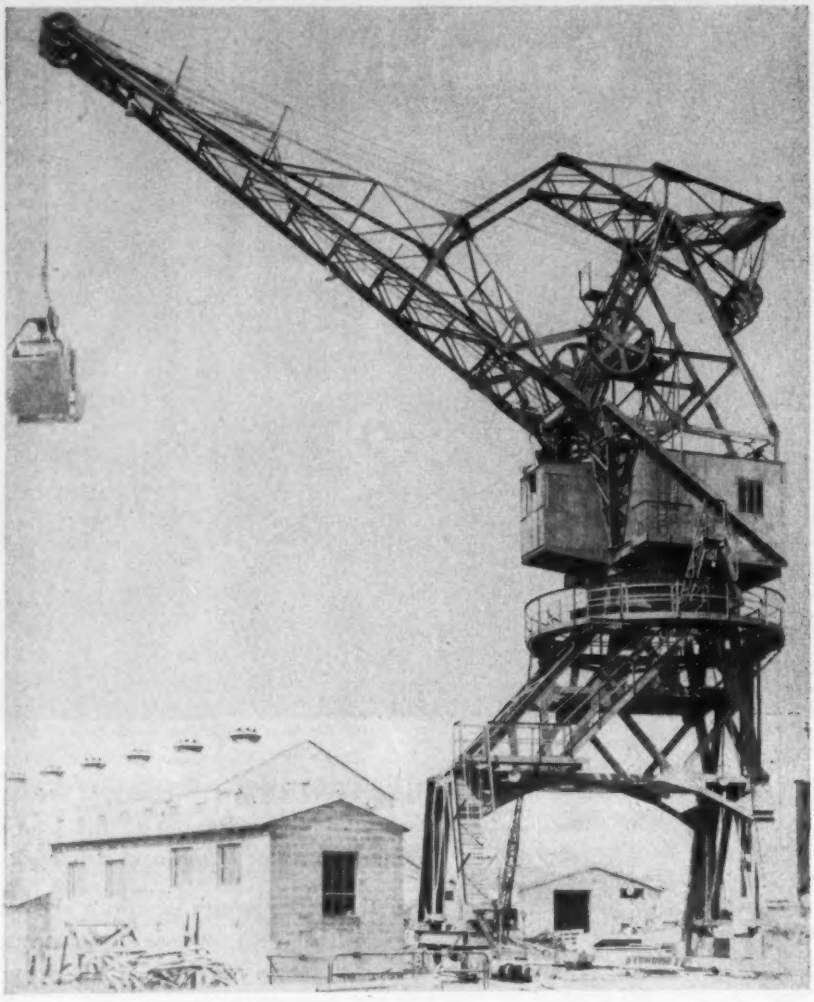
Illustrative of the success attending management's reconversion efforts is the showing of Monroe Auto Equipment Co., Monroe, Mich., manufacturer of a diversified line of products.

In the fiscal year ended June 30, Brouwer D. McIntyre, president of the company, reports that, despite shortages of steel and other fabricated parts, his company was able to push its production steadily upward and he predicts an even higher level of activity in the coming year.

"Prices and pricing policy remains one of the difficult problems of our industry," says Mr. McIntyre. "The continued demand for increased wages is resulting in further increased prices for the products of our suppliers and customers. In our own case, while increases in prices of materials and cost of labor have necessitated increased selling prices in many instances, this has been offset in some measure by the effect of our program of expansion, modernization and diversification."

Like other metalworking firms, continues Mr. McIntyre, the showing for the year ending in 1946 was mediocre. During this past year it had a better record because Monroe had improved its products, diversified its line, lowered its production costs and increased its manufacturing capacity.

In its expansion and modernization program, the company during the year just ended spent a total of $952,000 on additions to plants and equipment, bringing the total postwar expansion cost to $3,578,000. The firm now has a total floor space of 466,000 sq ft in two plants in Monroe and one in Hillsdale, Mich. Three shock absorber assembly lines are now in operation, says the Monroe president, and all the shock absorber operations are completely conveyorized. Automatic feed mechanisms have been developed for most stamping parts. A third Yoder electric tubing mill has been installed; several degreasers have been added; and a new truck seat assembly line is in operation at Hillsdale.



PORT CRANE FOR FRANCE: Seventy specially constructed electric gantry cranes are being built by Barium Steel Corp. through its subsidiary Clyde Iron Works, Duluth, Minn., for the French government. They will be used for loading and unloading ships at major French ports

These improvements have contributed toward boosting shock absorber capacity from 5000 per day in 1941 to 45,000 per day in 1947 and increasing sway bar output from 3000 per day in 1941 to 15,000 daily this year.

In regard to peacetime diversification, Mr. McIntyre reports that six new products have been added to Monroe's line. These items include a new type of hydraulic shock absorber for replacement on cars, trucks and other vehicles, hydraulic shock absorbers for railroad freight cars and tenders; steel pallets and drop bottom boxes for the materials handling field; and hydraulic seats for trucks and locomotive cabs. These products round out the company's general line which previously consisted of sway bars, rigid and hydraulic struts, materials handling equipment, gear shift control rods, tire pumps, molded rubber products, hydraulic seats for farm tractors and hydraulic shock absorbers for cars, trucks, busses, railroad passenger cars, subway cars and motorcycles.

Reflecting its greater diversification and postwar expansion, Monroe's sales, which totaled $15,599,929 for the fiscal year ended June 30, showed an increase of 58.8 per cent over the volume for the previous year and were five times those of the record prewar year ended June 30, 1941.

Officers of the company, in addition to Mr. McIntyre, who is president and general manager, are William D. McIntyre, vice president and treasurer; A. F. Meyer, vice president; Charles S. McIntyre, secretary and sales manager; and H. E. Lentz, assistant secretary.

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Wheatland Tube Co., Wheatland, Pa., manufacturer of butt-weld pipe, has installed standby oil heating equipment to protect itself from possible future natural gas shortages.

—o—

Structural Steel & Forge Co., Salt Lake City, Utah, expects to have the first steel fabricating plant in Utah ready for operation some time this winter. Firm will fabricate steel for roads, bridges, buildings and homes.

—o—

Youngstown Sheet & Tube Co., Youngstown, has received an award from the National Safety Council in recognition of 1,009,838 man-hours at its Brier Hill works without a disabling accident between Apr. 28 and July 3, 1947.

—o—

Twin Coach Co., Kent, O., delivered 205 motor coaches during August.

—o—

Carnegie-Illinois Steel Corp., Pittsburgh, subsidiary of United States Steel Corp., will hold open house at its Homestead works Oct. 16.

—o—

Kelite Products Inc., Los Angeles, manufacturer of industrial cleaning materials, has recently set up distributing points at Panama City; San Salvador; La Ceiba, Honduras; San Jose, Costa Rica; Curacao, N.W.I.; Mexico City and at Sidney, Melbourne, Brisbane, Newcastle and Adelaide in Australia. Firm also plans to organize similar distributing centers in South Africa and India.

—o—

Oakite Products Inc., New York, producer of cleaning materials and methods, is inaugurating a series of four regional technical-sales conferences throughout the United States from September through November, 1947.

—o—

War Assets Administration is offering for sale or lease a steel foundry in East Chicago, Ind., which has a capacity of 30,000 tons of heavy steel castings a year.

—o—

Carborundum Co., Niagara Falls, N. Y., manufacturer of abrasive products, has inaugurated an educational reimbursement program whereby its employee students upon the satisfactory completion of a course of study at a recognized educational institution will be reimbursed to the amount of $75.00 per semester and not more than $150 in a 12-month period.

—o—

Globe Union Inc., Milwaukee, manufacturer of storage batteries, electronic devices and other items, has taken over a plant occupied by the former Sahara Corp. in Mineral Ridge, O. Production of about 1000 batteries daily is expected at this Ohio plant.

—o—

Hunt Machine Works Inc., Greenville, S. C., designer and manufacturer of textile machinery and equipment, has been formed as the result of the consolidation of two former companies, Mountain City Foundry & Machine Co. and Hunt Loom Co. The address is 200 Academy St. in Greenville.

—o—

Permanente Metals Corp., Oakland, Calif., producer of aluminum and aluminum products, has established a research laboratory in Spokane, Wash., to be devoted exclusively to aluminum fabricated products. Director of the project is Paul Ziegler.

—o—

War Assets Administration has sold a carbon black plant in Odessa, Tex., for $4,300,000 to Sid W. Richardson, independent oil and gas operator. Operated by United Carbon Co. during the war, facility has a capacity of 45 million pounds of carbon black annually.

—o—

E. W. Bliss Co., Detroit, manufacturer of metalworking machinery, presses, dies, rolling mills and can-making equipment, is increasing the capacity of its Salem, O., plant. Approximately $350,000 worth of new machine tools will be added and several buildings will be remodeled to yield 33 per cent more floor space.

—o—

Special Devices Association, Port Washington, N. Y., composed of Naval Reserve officers and civilians who have served in the Special Devices Center, Office of Naval Research, has awarded its first annual Distinguished Service Award to General Motors Corp. for its "outstanding accomplishment in its scientific programs involving rapid learning techniques and mass training."

—o—

National Association of Home Builders, Washington, reports home construction was at the half-million mark in August and that 83,000 new homes were started during that month, more than at any time since 1925.

—o—

Great Lakes Plating Co., Chicago, job plating firm, has purchased Chicago Watchclock Corp., Chicago, manufacturer of portable watchmen's clocks, systems and accessories.

—o—

Struthers Wells Corp., West Warren, Pa., manufacturer of process and refining equipment, has purchased a forge plant in Titusville, Pa., for $105,000 from WAA. Firm used the plant during the war for production of large guns.

—o—

National Malleable & Steel Castings Co., Cleveland, producer of railroad specialties, automotive products, chains and other items, last week honored 17 men and 14 women who have completed 35 years and 25 years of service, respectively. The firm now has a total of 54 employees with these lengths of service.

—o—

War Assets Administration announces that bids submitted last Aug. 15 for two surplus blast furnaces and the coke ovens at Granite City, Ill., have been declined as inadequate. New bids can be submitted until Oct. 6. Plant originally cost the government over $8 million. Highest of the rejected bids was for $2,250,000, payable over 15 years without interest.

—o—

American-LaFrance-Foamite Corp., Elmira, N. Y., manufacturer of fire-fighting apparatus and equipment, has acquired controlling interest in International Meters Inc., New York, which will be used as a separate sales company for the distribution of an Alfco Twin Automatic Parking Meter, a unit which parks two cars independently of each other, with but one meter, one clock, one housing, one pedestal and one coin box.

—o—

Bowers Battery & Spark Plug Co., Reading, Pa., has opened a plant at 2532 E. 49th St., Los Angeles, and will manufacture auto, truck and bus storage batteries and battery type lead oxide. James K. Harwood is general manager.

—o—

Kelly Reamer Co., Cleveland, manufacturer of metal cutting tools, has appointed Milroy Steel & Supply Co. as its sales and engineering representative for Indiana. Firm has offices in Indianapolis and Anderson, Ind.

The Business Trend

Current Industrial Pace Equals Postwar Record

DISPLAYING increased strength, industrial activity in the week ended Sept. 20 climbed back to the postwar high mark established in March. This places STEEL's industrial production index at 164 per cent (preliminary) of the 1936-1939 average, and represents a five-point rise over the week ended Sept. 13.

AUTOS — Contributing substantially to the brisk activity was the automobile industry, which in the week ended Sept. 20 produced an estimated 110,088 passenger cars, trucks and busses, a new postwar high. In the preceding week, production totaled 106,095. Previous postwar high had been 108,472 units in the week ended Mar. 22. The auto makers, who have been handicapped by an insufficiency of sheet steel, now fear they will be hampered by a shortage of workers. To help overcome the latter problem, the industry is hiring increasing numbers of women.

STEEL—Recovery of steel ingot production from effects of a wildcat railroad strike at Pittsburgh continues, as demand for steel, particularly flat-rolled products, shows no signs of easing.

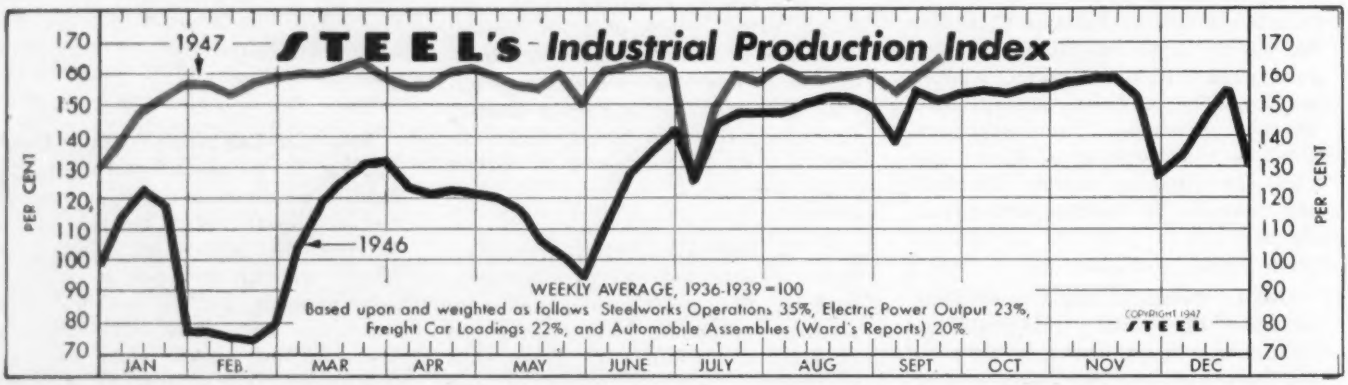
COAL—Highest weekly production of bituminous coal since the miners began working under their new contract in July was attained in the week ended Sept. 13, when output was estimated at 12,600,000 net tons. Production in the preceding week, marked by a holiday, was only 10,650,000 tons.

BUILDING — Valuation of building permits in 215 cities in August was higher than in any month since March, 1946, and with that exception was higher than at any time since April, 1929, says Dun & Bradstreet Inc. The August total was $290,043,558; July's figure was $282,246,130.

PRICES — Continuing its upward movement, the wholesale price index of the Bureau of Labor Statistics in the week ended Sept. 13 touched a new postwar high for the eleventh consecutive week. At 157.4 per cent of the 1926 average, the index was only 5.9 per cent below the all-time peak of May, 1920.

CASTINGS—Effects of the coal miners' strike, vacations and hot weather are reflected in a decline in the July shipments of gray iron castings to lowest level for this year, 912,939 tons, compared with 1,038,356 tons in June. Unfilled orders at 2,675,138 tons at the end of July showed only a 35,716-ton decline from the end of June.

FURNACES — Reflecting the consumer switch from coal heat to gas and oil, particularly the latter, factory shipments of warm air oil furnaces in the first six months of 1947 jumped to 127,268 units, compared with 23,040 in the like period of 1946, while solid fuel furnaces fell from 161,058 units in the first half of 1946 to 139,948 in the first half of 1947. Gas furnace shipments rose from 80,615 in the first half of 1946 to 101,221 in the first half of 1947.



The Index (see chart above): Latest Week (preliminary) 164 Previous Week 159 Month Ago 159 Year Ago 151

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)†	87.5	82.0	93.0	90.0
Electric Power Distributed (million kilowatt hours)	4,977	5,053	4,953	4,507
Bituminous Coal Production (daily av.—1000 tons)	2,100	1,775	1,958	2,148
Petroleum Production (daily av.—1000 bbl.)	5,200	5,217	5,153	4,775
Construction Volume (ENR—Unit $1,000,000)	$90.6	$146.2	$109.4	$116.8
Automobile and Truck Output (Ward's—number units)	110,088	106,095	84,726	80,972

* Dates on request. † 1947 weekly capacity is 1,749,928 net tons. 1946 weekly capacity was 1,762,381 net tons.

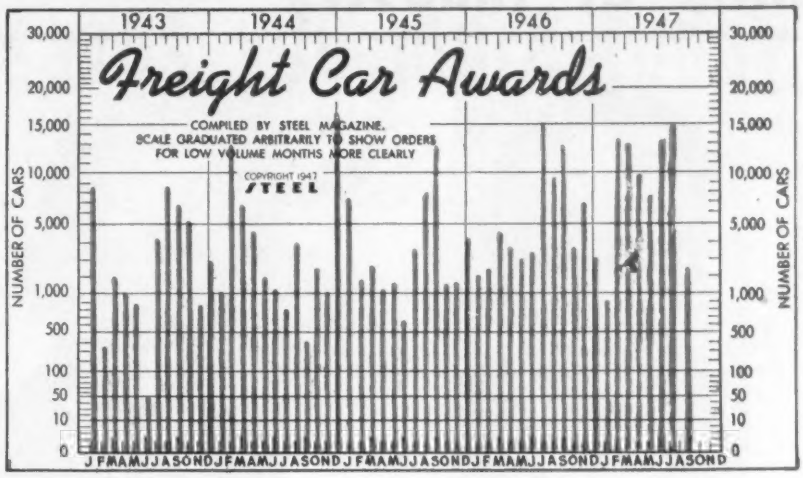
TRADE				
Freight Carloadings (unit—1000 cars)	925†	922	901	899
Business Failures (Dun & Bradstreet, number)	73	75	59	19
Money in Circulation (in millions of dollars)‡	$28,633	$28,742	$28,239	$28,453
Department Store Sales (change from like wk. a yr. ago)‡	—1%	+1%	—6%	+37%

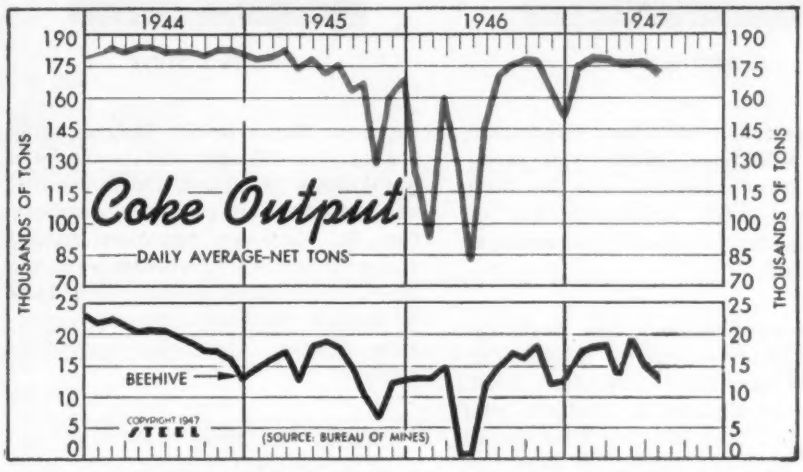
† Preliminary. ‡ Federal Reserve Board.

Freight Car Awards

	*1947	*1946	1945	1944	1943
Jan.	9,172	1,500	7,200	1,020	8,365
Feb.	13,727	2,403	1,750	13,240	350
Mar.	12,049	4,512	2,500	6,510	1,935
Apr.	8,836	3,764	1,120	4,519	1,000
May	7,390	3,025	1,526	1,952	870
June	13,084	3,335	670	1,150	50
July	14,865	14,836	3,500	795	4,190
Aug.	2,376	9,629	7,240	3,900	8,747
Sept.	.....	.....	12,768	12,840	400	6,820
Oct.	.....	.....	3,407	1,320	2,425	5,258
Nov.	.....	.....	6,707	1,650	1,065	870
Dec.	.....	.....	3,041	4,116	16,245	2,919
Total	.....	.....	68,927	45,432	53,221	41,374

* American Railway Car Institute.


1943
1944
1945
1946
1947
Freight Car Awards
COMPILED BY STEEL MAGAZINE.
SCALE GRADUATED ARBITRARILY TO SHOW ORDERS FOR LOW VOLUME MONTHS MORE CLEARLY
COPYRIGHT 1947 STEEL
NUMBER OF CARS
30,000
20,000
15,000
10,000
5,000
1,000
500
100
50
10
0
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D



Coke Output

Bureau of Mines

(Daily Average—Net Tons)

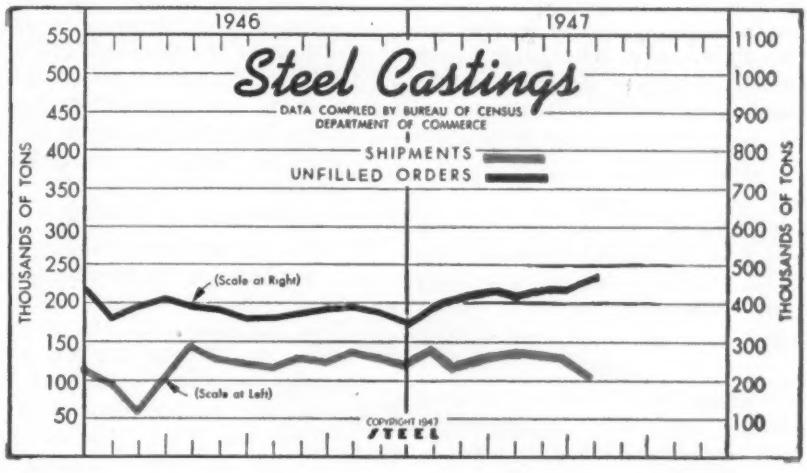
	Oven		Beehive	
	1947	1946	1947	1946
Jan.	181,245	122,570	18,124	13,093
Feb.	183,189	93,985	18,372	13,140
Mar.	182,529	161,290	18,725	14,962
Apr.	179,428	128,394	14,315	713
May	178,398	83,019	18,922	869
June	177,416	148,100	15,054	12,600
July	173,312	172,700	13,584	15,600
Aug.	.....	176,195	.....	16,892
Sept.	.....	178,156	.....	16,167
Oct.	.....	177,817	.....	17,954
Nov.	.....	164,165	.....	12,028
Dec.	.....	153,826	.....	12,302
Ave.	.....	146,877	.....	11,991

Commercial Steel Castings

(Net tons in thousands)

	Shipments		Unfilled Orders*	
	1947	1946	1947	1946
Jan.	139.0	102.5	365.5	359.5
Feb.	125.6	60.6	421.4	387.2
Mar.	134.9	104.5	434.9	406.4
Apr.	144.2	146.6	427.6	384.7
May	140.9	130.8	443.2	374.2
June	139.0	121.5	445.5	354.4
July	117.0	117.5	473.9	356.8
Aug.	....	129.7	....	373.7
Sept.	....	126.5	....	380.6
Oct.	....	137.3	....	384.1
Nov.	....	130.6	....	372.1
Dec.	....	123.9	....	362.8

* Castings for sale.



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$13,673	$12,026	$12,030	$14,061
Federal Gross Debt (billions)	$259.0	$259.3	$260.0	$265.5
Bond Volume, NYSE (millions)	$17.7	$18.4	$14.9	$38.8
Stocks Sales, NYSE (thousands)	4,180	3,718	3,073	10,688
Loans and Investments (billions)†	$64.3	$63.8	$63.5	$59.2
United States Gov't. Obligations Held (millions)†	$38,699	$38,354	$38,588	$40,595

† Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$75.41	$75.41	$75.41	$64.45
All Commodities†	157.4	154.9	152.7	121.7
Industrial Raw Materials†	171.9	168.5	166.8	138.4
Manufactured Products†	152.5	150.1	147.8	115.9

† Bureau of Labor Statistics Index, 1926=100.

Men of Industry

CHARLES W. GERSTER

G. REED SCHREINER

CHARLES S. SLITER

Charles W. Gerster has been appointed general manager of the Louthan Mfg. Co., East Liverpool, O., which was recently purchased by Harbison-Walker Refractories Co., Pittsburgh. Mr. Gerster has been employed in various capacities since he joined Louthan Mfg. Co. in 1930.

—o—

Harold E. Nagle has been appointed general superintendent, Stamford Division, Yale & Towne Mfg. Co., New York. Formerly superintendent of methods in the division, he is succeeded in that position by **Frank J. Billingsley,** who has conducted many special investigations as a methods engineer since he was placed in the methods department in 1931.

—o—

Charles M. Greene, vice president and general manager, Sperry Gyroscope Co. Inc., subsidiary of Sperry Corp., New York, has been elected a director of the subsidiary company.

—o—

William W. Winkler, treasurer, Durant Mfg. Co., Milwaukee, has been appointed general manager of the company.

—o—

Carl J. Koelsch has been appointed steel buyer for the Detroit Division of the Budd Co., Philadelphia. For the last three years he has been director of purchases for Fruehauf Trailer Co. in Detroit.

—o—

Harmon Lewis, president and director of the Alcoa Steamship Co., and a director of several of the subsidiary companies of Aluminum Co. of America, Pittsburgh, has resigned to take an active part in the management of the Warren McArthur Corp., Litchfield, Conn. He will be succeeded in the presidency of Alcoa Steamship Co. by **William C. White,** vice president of that company, who has been associated with Aluminum Co. of America and its subsidiary companies since 1928.

—o—

G. Reed Schreiner has been appointed director of advertising, United States Steel Corp., New York, to succeed **Charles R. Moffatt,** who retires Sept. 30. Mr. Schreiner began his 28 years of service in advertising departments of U. S. Steel subsidiaries in 1919 when he was employed by the Carnegie Steel Co. He was made assistant advertising manager of the Carnegie-Illinois Steel Corp. in 1936, and promoted to advertising manager two years later. In 1947 he became assistant director of advertising of U. S. Steel Corp.

—o—

Appointment of **Ray W. Qualley** as chief product design engineer has been announced by the Meyer Furnace Co., Peoria, Ill. He will have charge of the development of new automatic heating equipment for the Meyer and Weir lines. Mr. Qualley formerly had been heating laboratory supervisor for Airtemp Division of Chrysler Corp., at Dayton, O., and prior to that position had been with the Minneapolis-Honeywell Regulator Co., Minneapolis, for 11 years.

—o—

Harold F. Oswald has become affiliated with the Blaw-Knox Co., New York district office, in engineering and sales of process equipment and complete chemical plants.

—o—

Archibald H. Ballard has been appointed director of research for Norton Co., Worcester, Mass., to be in charge of the company's research laboratories at Chippawa, Ont. He succeeds **Raymond R. Ridgway,** deceased. Mr. Ballard will be assisted by **Wallace M. Hazel,** chief chemist, and **Fred H. Young,** control engineer. **Guy H. Fetterley** has been named research engineer, responsible for the products research section, and **John A. Tupper,** research engineer, responsible for the manufacturing control section.

—o—

Charles S. Sliter has been appointed assistant general sales manager, Kellogg Division, American Brake Shoe Co., New York. Mr. Slitter, who was formerly sales promotion manager, has served in various sales capacities with Kellogg since first joining the company in 1940. In his new position he will continue to direct promotional and advertising activities of the division. He will be located at the main plant in Rochester, N. Y., which manufactures air compressors and paint spray equipment.

—o—

James G. Graham has been appointed sales manager, Railroad Division, Fairbanks, Morse & Co., Chicago. He joined the organization a year and a half ago as district manager of the division. He maintains headquarters at Chicago.

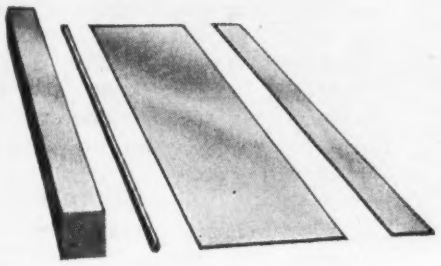
—o—

Nelson J. Leonard has been placed in charge of the Elwell-Parker trucks, tractors and cranes account for the Colby Steel & Engineering Co., Seattle.

—o—

John H. Thomas will succeed **George E. Gregory** as vice president and purchasing director of Owens-Corning Fiberglas Corp., Toledo, O., and **Ben S. Wright** has been appointed general sales manager, these

why Stainless saves you more today *than ever before...*



There's a reason why economy-minded manufacturers are switching to stainless steels for equipment, maintenance and repair work and many consumer products as well. Stainless *saves you more* today than ever before.

this is why:

Fabricating and installation costs are high whether you use short-lived materials or ARMCO Stainless Steels. With these rustless steels you'll have far fewer replacements and repairs . . . *much less repetition of high installation costs* . . . and lower over-all costs in the long run.

The chart indicates how much greater proportion of total cost is now represented by manpower than was the case 10 years ago.

INCREASES (1937-1947)

HOURLY WAGE RATES 90.03%

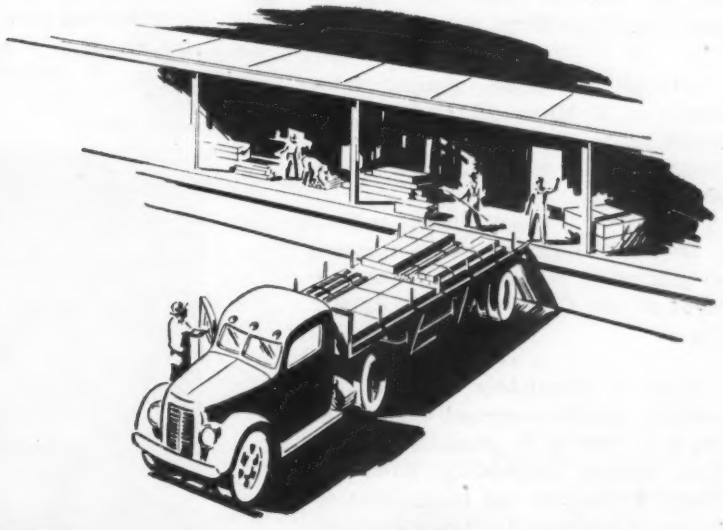
WHOLESALE PRICES 73.3%

ARMCO STAINLESS STEELS 10%

rates up 90.03%

Bureau of Labor Statistics reveal that hourly wage rates in manufacturing and allied industries went up 90.03% from 1937 to April, 1947. The index of wholesale prices of materials increased 73.3%.

Meanwhile the average price of ARMCO Stainless Steel increased *only 10%* in the past 10 years. Yet ARMCO Stainless Steels are more diversified, more versatile than ever before. Their advantages include excellent resistance to heat and corrosion, great strength, attractive appearance, and decided sales appeal.



quick deliveries

Whether you use sheets, strip, plates, bars or wire, ARMCO Stainless Steels are available for quick deliveries. Call our nearest district office or Armco Distributor, or write The American Rolling Mill Co., 366 Curtis St., Middletown, Ohio.

• • • •

Help keep steel flowing from the mills by turning in your scrap. The need is critical—the shortage *greater* than during the war.

ARMCO

Armco Stainless Steels

changes to be effective Oct. 1. Mr. Gregory is resigning from Owens-Corning to become president of the Morton-Gregory Co. Inc., a new organization being formed to manufacture and sell industrial and consumer products calling for use of Fiberglas yarns.

—o—

The National Acme Co., Cleveland, announces appointment of **Herbert W. Smith** as direct European representative, with headquarters at Birmingham, Eng. For the past 13 years, Mr. Smith has specialized in multiple spindle engineering for National Acme representatives, B.S.A. Tools Ltd., Birmingham. On Sept. 1, 28 years after his first association with National Acme, he has assumed over-all direct representation for the company's sales-engineering requirements covering its representative outlets in England, Sweden and continental Europe.

—o—

Carl W. Jordan has been appointed vice president of the Horton Mfg. Co., Ft. Wayne, Ind., manufacturer of washing machines and ironers.

—o—

M. D. V. Millard has been appointed assistant manager of sales of the Detroit district sales office of American Steel & Wire Co., subsidiary of U. S. Steel Corp. Associated with the company since 1934, he served in the sales department in Cleveland and Washington before joining the U. S. Navy during the war. In 1945 Mr. Millard became a salesman in the Manufacturers Products Division, New York office.

—o—

Norman E. Perry has been appointed assistant general sales manager in charge of the western United States for the Pontiac Motor Division of General Motors Corp., Detroit.

—o—

William E. Boyce, general sales manager of Micamold Radio Corp., Brooklyn, N. Y., has been named sales manager of a new Micamold jobber sales division.

—o—

Dwaine Edsall has been promoted to production manager of the Akron plant of the General Tire & Rubber Co.

—o—

Emil F. Thierfelder has been appointed chief development engineer at Plant 1, Ilion, N. Y., Remington Rand Inc., Buffalo, succeeding **Edwin O. Roggenstein,** who has resigned to establish a new manufacturing business, Elec-Tricks Toys Inc., in Utica, N. Y.

—o—

Smaller Manufacturers Council has elected the following officers to serve for the ensuing year: President, **J. Lewis Palley,** president, Palley Mfg. Co., Pittsburgh; first vice president, **W. F. Chase,** president, Bearing Service Co., Pittsburgh; second vice president, **E. M. Rodenbaugh,** president, National Metal Products Co., Pittsburgh; treasurer, **H. A. Calderwood,** president, Armstrong & White, Cheswick, Pa.; secretary, **C. E. Robinson,** vice president, Sommerfeld Machine Co., Braddock, Pa.; and assistant secretary-treasurer, **Geraldine M. Joyce,** Chamber of Commerce Bldg., Pittsburgh. The following directors were elected to serve for a three-year period: **W. F. Chase, J. Lewis Palley, John M. Phillips Jr.,** vice president, Phillips Mine & Mill Supply Co., and **Louis L. Vayda,** president, Bacharach Industrial Instrument Co., both of Pittsburgh.

—o—

Robert L. Klein, formerly director of research and development, Presmet Corp., Worcester, Mass., has been elected president of the Windalume Corp., West New York, N. J.

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W. B. Eckenhoff has been named sales manager of Roberts & Mander Corp., Hatboro, Pa., manufacturer of appliances.

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Frank A. Haag has joined the sales staff of Jack & Heintz Precision Industries Inc., Cleveland, to assume full charge of sales application work on the hermetically-sealed refrigeration compressor manufactured by the company. He has been connected for the past two years with the Salem Engineering Co., Salem, O., and previously was with Kold Hold Mfg. Co., Lansing, Mich., and Fedders Mfg. Co., Buffalo.

—o—

C. F. Wiley has been promoted to assistant manager, Chicago district sales office of American Steel & Wire Co., Cleveland, subsidiary of U. S. Steel Corp., with responsibility of all phases of the company's sales in the Chicago area. **Bruce D. Bennett** has been named manager of the Electrical, Wire Rope & Construction Materials Division in Chicago, succeeding Mr. Wiley.

FRANK A. HAAG

—o—

E. E. Louis has been appointed assistant to vice president in charge of sales, American Steel & Wire Co., Cleveland, subsidiary of U. S. Steel Corp. **M. C. Harriman** has been named assistant manager, Merchant Products Sales Division, succeeding Mr. Louis.

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Electro-Motive Division, La Grange, Ill., General Motors Corp., announces the following organization changes: **R. L. Terrell,** district sales manager at Washington, has been appointed general parts manager, with headquarters at La Grange. **W. D. Davis,** parts manager, has been appointed to head a newly created service repair department, including five branch repair shops, with headquarters at La Grange. **A. O. Meyers,** manager of the demonstration section of the sales department at La Grange, has been appointed district sales manager at Washington. The following changes also have been announced: **W. E. Dunn,** Chicago regional service manager, appointed assistant to regional manager, with headquarters at Denver. He is succeeded at Chicago by **A. R. Walker,** sales representative in Chicago. **F. T. Battey,** product application engineer at La Grange, appointed assistant regional service manager, Chicago, succeeding **L. H. Chancey,** appointed district engineer, Chicago. **G. R. Oesterreich,** district engineer, Barstow, Calif., has been appointed district engineer, Chicago.

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W. J. Earle has been appointed manager for Cuba, Mexico and Puerto Rico in the Apparatus Division of International General Electric Co., Schenectady, N. Y. He will maintain headquarters at Schenectady.

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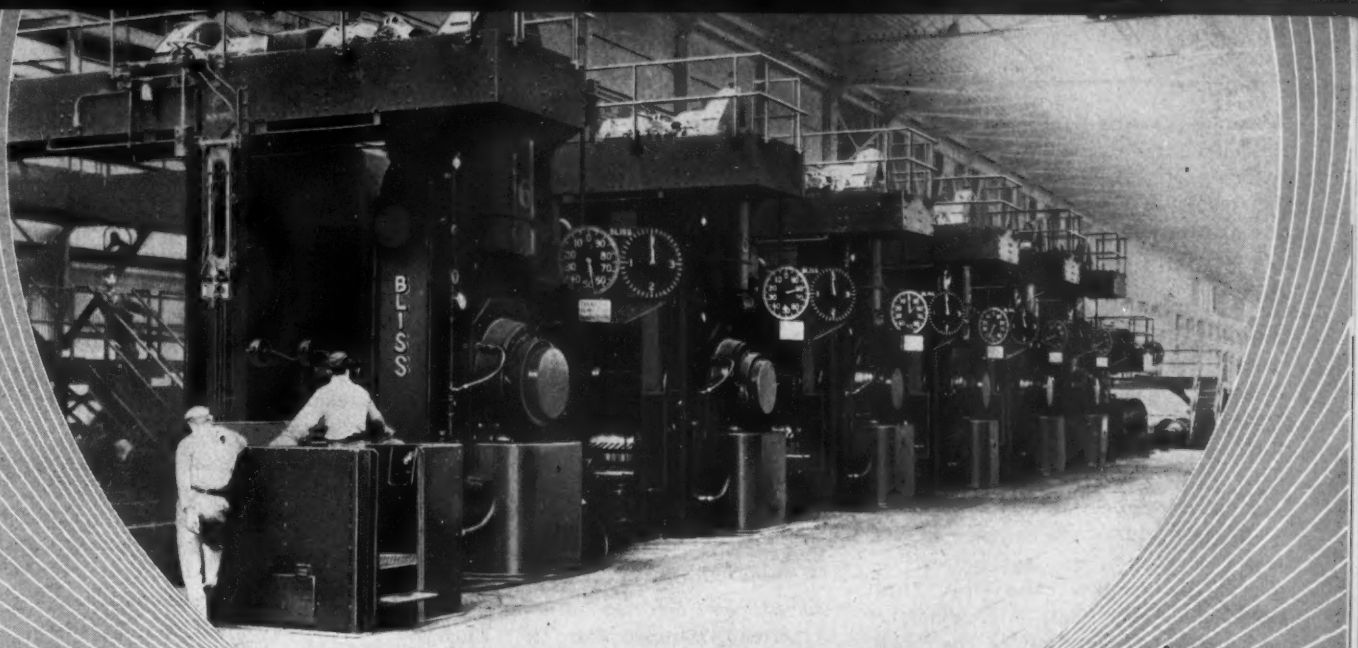
Wilfred B. Holton Jr., president, Walworth Co., New York, was presented the President's Certificate of Merit for his outstanding contributions to the Navy's shipbuilding and repair programs during World War II.

—o—

Grenville R. Holden, vice president of Sylvania Electric Products Inc., New York, has been elected to the board of directors of Electronic Tubes Ltd., London, Eng., a British radio tube manufacturing affiliate of



Bliss 21" x 48" x 48" Hot Strip Mill.

Rolling Mill efficiency in full measure

Why do so many outstanding sheet and strip mill installations carry the Bliss name-plate? Because "Bliss-Built" means year-in and year-out operating efficiency...a product of field-seasoned engineering geared to each individual rolling requirement, large or small.

Bliss builds two-, three- and four-high mills for hot and cold rolling, single stand reversing, or tandem operation on ferrous and non-ferrous metals; also cluster mills—plus a wide variety of accessory equipment, including mandrel type hot coilers, upcoilers, slitters, reels, etc.

For a full measure of rolling mill efficiency, call on Bliss. Our engineers will gladly work with you in appraising your current needs.

STAY AHEAD WITH *Bliss*

E. W. BLISS COMPANY

Salem, Ohio

- rolling mills
- mechanical and hydraulic presses
- can and container machinery

Sylvania Electric. In addition, Mr. Holden will continue to carry on his general corporate responsibilities at the company's executive headquarters in New York. Prior to joining Sylvania in 1943, he was chairman of the State Department's Committee for Rehabilitation of Scandinavia, and during the war served as special assistant to Leon Henderson, OPA administrator, responsible for organizing the tire rationing program.

—o—

R. G. McElwee, manager, Foundry Alloy Division, Vanadium Corp. of America, New York, has been chosen as chairman of the Gray Iron Division of American Foundrymen's Association. Formerly vice chairman of the division, he has also served as head of the cupola research group and vice chairman of the program and papers committee. He succeeds, as chairman, **Russell J. Allen,** metallurgical engineer with Worthington Pump & Machinery Corp., Harrison, N. J., who has resigned the chairmanship because of ill health.

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Charles R. Diebold, Buffalo attorney and former head of the New York office of the Reconstruction Finance Corp., has been named by the U. S. Government to represent the Alien Property Custodian on the board of directors of the Buffalo Electro-Chemical Co. Inc.

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Morris Sanders, New York architect, has been retained by Formica Insulation Co., Cincinnati, as a consultant on plastics, product development and design.

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Seventeen industrialists nominated for election to the board of trustees of Navy Industrial Association are: For term expiring 1950: **H. H. Buttner,** Federal Telephone & Radio Corp., New York; **M. H. Eisenhart,** Bausch & Lomb Optical Co., Rochester, N. Y.; **C. C. Felton,** Revere Copper & Brass Inc., New York; **C. M. Jones,** John A. Roebling's Sons Co., Trenton, N. J.; **H. C. Ramsey,** Worthington Pump & Machinery Corp., Harrison, N. J.; **A. G. Roach,** Consolidated Steel Corp., Los Angeles; **E. E. Puryear,** Texas Co., New York; **R. C. Simmons,** Johns-Manville Sales Corp., New York; **E. E. Potter,** General Electric Co., Schenectady, N. Y.; **J. W. Shipman,** Automatic Electric Co., Chicago; **E. W. Nick,** Northern Equipment Co., Erie, Pa.; **A. M. Russell,** Ohio Chemical & Mfg. Co., New York; **W. C. Umstattd,** Timken Roller Bearing Co., Canton, O.; **W. G. Wood,** Consolidated Shipbuilding Corp., New York; **C. E. Beardslee,** Borden Co., New York. For term expiring 1948, **John A. Zellers,** Remington-Rand Inc., New York, and for term expiring 1949, **R. A. O'Connor,** Magnavox Co., Ft. Wayne, Ind.

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Dan A. Kimball, vice president, Aerojet Engineering Corp. of Azusa, Calif., subsidiary of General Tire & Rubber Co., Akron, has been elected executive vice president of the subsidiary company.

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E. W. Keller has been appointed director of purchases, Wayne Pump Co., Ft. Wayne, Ind. He formerly served as director of purchases, American Bantam Car Co., Butler, Pa., and had been purchasing agent for C. G. Hussey & Co., Pittsburgh.

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C. W. Ballard, assistant manager, Hercules Powder Co., Wilmington, Del., in the explosives department, Pittsburgh district office, has been made assistant general manager of the company's cellulose products department in Wilmington.

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W. M. Pearson has been named sales manager, Dealer Division of Pioneer Gen-E-Motor Corp., Chicago.

—o—

Paul R. Paletti, representative in Seattle for Ekco Products Co., Chicago, has been named sales manager of Ekco Products Co. Ltd., Canada, with headquarters at Toronto. He succeeds **W. B. Eakin,** who will handle the company's key Canadian accounts.

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M. J. Grady, for the past four years sales manager, Bathroom Accessories Division, Gerity-Michigan Die Casting Co., Adrian, Mich., has been appointed general manager of the E. C. Smith Mfg. Corp., Chicago. He also will be in charge of the company's sales and advertising.

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Robert V. Misar has been appointed manager, merchant products department, New York district sales office of American Steel & Wire Co., subsidiary, U. S. Steel Corp.

—o—

Claude F. Harris has been appointed western manager, industrial sales, of the Sherwin-Williams Co., Cleveland. He will have headquarters in Chicago. Mr. Harris succeeds **Lyman V. Weber,** resigned.

—o—

L. A. Welch has been appointed executive vice president, R. G. LeTourneau Inc., Peoria, Ill. He will augment the present direction of other principal LeTourneau officers, and will assist in co-ordinating the functions of the division managers at the company's factories in Longview, Tex., Toccoa, Ga., and Vicksburg, Miss. During the war Mr. Welch was deputy director of production, WPB, and is president of the Avery Farm Machinery Co., Peoria.

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David A. Katcher has been appointed editor of a new semi-popular magazine on physics to be published next year by the American Institute of Physics, New York.

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Henry N. Muller Jr., former manager of graduate student training, Westinghouse Electric Corp., Pittsburgh, has been named manager of the entire educational department. He is succeeded in his former position by **Guy Kleis,** previously super-

A. GORDON SPENCER

Will open branch office for George L. Nankervis Co., Detroit, which will service the Saginaw Valley district. Noted in STEEL, Sept. 22 issue, p. 68

CHARLES R. MOFFATT

Retires Sept. 30 as director of advertising, United States Steel Corp., after 40 years' continuous service. Noted in STEEL, Sept. 22 issue, p. 68

SAM STERLING

Has been elected vice president in charge of sales, Reading Tube Corp., New York. Noted in STEEL, Sept. 22 issue, p. 71

JOHN W. LOHNES

Appointed general sales manager, International Graphite & Electrode Corp., St. Marys, Pa. Noted in STEEL, Sept. 22 issue, p. 68

JOSEPH G. MAGRATH

Has been selected by American Welding Society as executive secretary of the Society. Noted in STEEL, Sept. 22 issue, p. 68

visor of engineer training. Mr. Muller succeeds **Charles W. MacLean,** resigned.

—o—

Two members elected to the board of directors of American Cladmetals Co., Pittsburgh, are: **C. H. Hunt,** consulting engineer and head of C. H. Hunt Inc., a Pittsburgh technical organization, and **Porter S. Kier,** comptroller of the Columbia Radiator Co., McKeesport, Pa. Mr. Hunt and his staff are in charge of reconstruction and enlargement of the plant and strip rolling mills of the Steel Co. of Canada Ltd., Hamilton, Ont., and have had similar responsibility for the Fontana plate mill and other major projects at the Kaiser Co. Inc., Fontana, Calif. Prior to forming his own organization ten years ago, Mr. Hunt had been assistant to the president of Weirton Steel Co., Weirton, W. Va., and consultant to Great Lakes Steel Corp. and Hanna Furnace Co., subsidiaries of the National Steel Corp., Pittsburgh. Mr. Kier, besides his association with Columbia Radiator Co., is secretary and a director of the East Brady Fuel-Gas Co., and for some years had been connected with the Pittsburgh Coal Co. as director of budgets.

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L. H. Valette has been appointed superintendent of the universal mill at Midland Works, Crucible Steel Co. of America, New York. He formerly had been associated with Carnegie-Illinois Steel Corp. at Gary, Ind.

—o—

Earle S. MacPherson, until recently chief engineer of the Chevrolet Light Car Division of General Motors Corp., Detroit, and assistant to the vice president of General Motors, in charge of engineering, has been appointed executive engineer with Ford Motor Co., Dearborn, Mich., sharing joint executive responsibility with John Oswald, also recently named executive engineer. They will consult on all Ford, Lincoln and Mercury products.

—o—

William H. Ross has been appointed New England representative for the Gensco Tool Division, General Steel Warehouse Co. Inc., Chicago. He formerly had been connected with Biltmore Products Inc., Rochester, N. Y. He succeeds **Eric Kihlstrom** as Gensco representative in the New England territory. Mr. Kihlstrom will supervise sales from the company's home office.

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J. E. Ulrich, formerly with Hobbs Battery Co., San Francisco, has been appointed vice president and general sales manager of International Battery Corp., Los Angeles.

OBITUARIES

Floyd K. Lawson, 48, executive vice president and treasurer, George D. Roper Corp., Rockford, Ill., died Sept. 19 in West Yellowstone, Mont.

—o—

Henry P. Arbenz, 59, for 30 years associated with F. W. Marshall & Co., Philadelphia, died recently in that city as a result of injuries sustained in an accident last July. He began his business career with Stanley G. Flagg & Co., Stowe, Pa., malleable founders, eventually becoming purchasing agent. Prior to joining the Marshall Co., he had been affiliated with Debevoise-Anderson Co. in the sale of pig iron.

—o—

Fred D. Ziemann, 47, treasurer of the Utica Radiator Corp., Utica, N. Y., died recently of a heart attack. He had been associated with the corporation for the past 12 years.

—o—

George M. Berry, 69, industrial metallurgist, died recently in Syracuse, N. Y. He taught metallurgy and foundry practice at Syracuse University from 1917 until his death. Mr. Berry had been associaed with the Halcomb Steel Co. plant in Syracuse as chief chemist for many years.

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J. Arthur Jacobsen, 59, assistant secretary and assistant treasurer, Chile Copper Co. and the Andes Copper Mining Co., subsidiaries, Anaconda Copper Mining Co., New York, died recently while on a vacation in the Pocono mountains.

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Lawrence E. Goldrick, 35, chief engineer, Ericksen Steel Co., Cleveland, was killed in a traffic accident Sept. 20, while driving home from Chicago, where he had attended the Machine Tool Show.

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Harold M. Kane, 45, president and treasurer, Harold M. Kane Inc., New York, died Sept. 15.

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Ralph B. Wilson, 60, executive vice president, William A. Reynolds & Co., Cleveland, and previously an executive of General Electric Co., Schenectady, N. Y., died Sept. 20.

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Price M. Davis Sr., 77, president and general manager, Shadbolt & Boyd Co., and of the Northern Hardware & Supply Co., Menominee, Mich., died Sept. 21 of a heart attack.

—o—

Alexander M. McWilliams, president, McWilliams Forge Co. Inc., Rockaway, N. J., died Sept. 11.

Effect of Heat Treating and Cold Rolling On Crystal Structure of

AUSTENITIC MANGANESE

By N. P. GOSS
Consulting Physicist
Cleveland

In this first of a two-part article the author discusses x-ray diffraction method of following alterations in grain structure beyond the microscope's range. Mosaic theory of sub-boundary structure is used to explain changes taking place in heat treated Hadfield steels

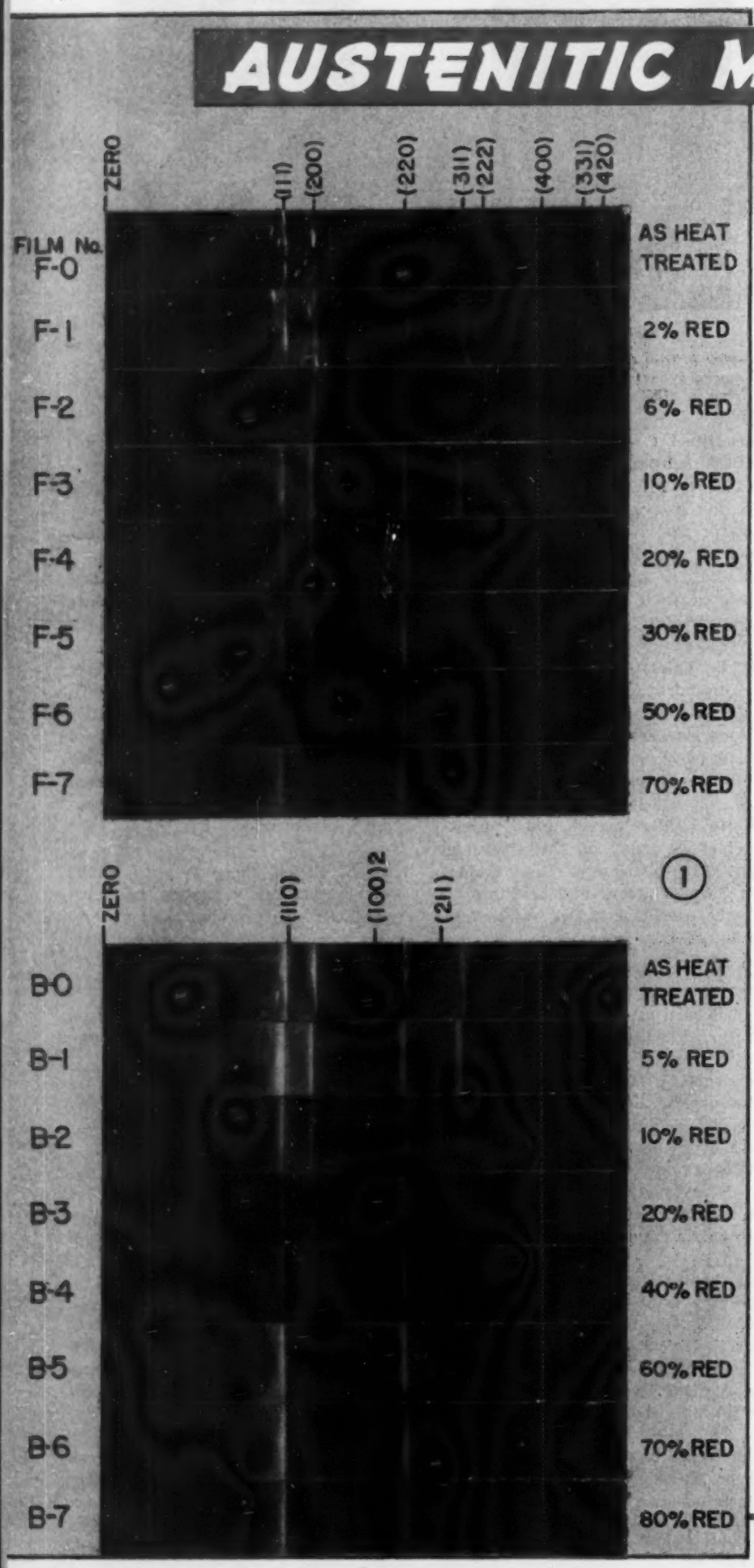
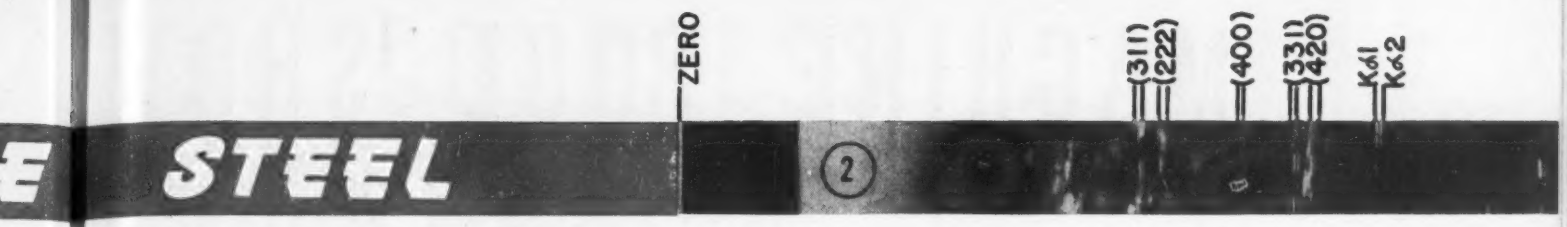


Fig. 1—Series of cold reductions. Specimen F shows no alpha present while specimen B shows some alpha in heat treated state which persists through cold rolling. Examinations made at 10° with molybdenum radiation and zirconium oxide filter

Fig. 2—X-ray spectra of austentic Hadfield manganese steel. Note well resolved alpha doublets signifying large mosaic elements with very small dislocations. Specimen was held at 1900°F for 1 minute and water quenched. Molybdenum radiation with zirconium oxide filter and specimen set at 35° to x-ray

Fig. 3—A—Hadfield steel cold rolled from 0.119 to 0.050-inch and heat treated at 1400°F for 24 hours; B—same as A, cold rolled after heat treatment to 0.030-inch. Molybdenum radiation with zirconium oxide filter and specimen set 10° to x-ray beam. The many faint lines are due to the carbide phase

Fig. 4—A—Hot rolled, held at 900°F for 72 hours; B—hot rolled, held at 900° F for 160 hours; C—hot rolled, cold rolled 0.118 to 0.050-inch then held at 900° F for 27½ hours; D—hot rolled, cold rolled 0.118 to 0.050-inch, held at 900° F for 49½ hours and then at 1300-1400° F for 2½ hours. X-ray diagrams taken at 10°



EXPERIMENTAL evidence was presented in a previous paper[1] to support the contention that the extreme hardness developed in austenitic or Hadfield manganese steel by cold rolling is due to the smallness of the mosaic elements, more commonly known as grain fragments. The smaller the mosaic element, the harder the metal will be. In the case of Hadfield manganese steel, a hardness of C-58 can be attained when a reduction of 82 per cent in thickness is given to this material.

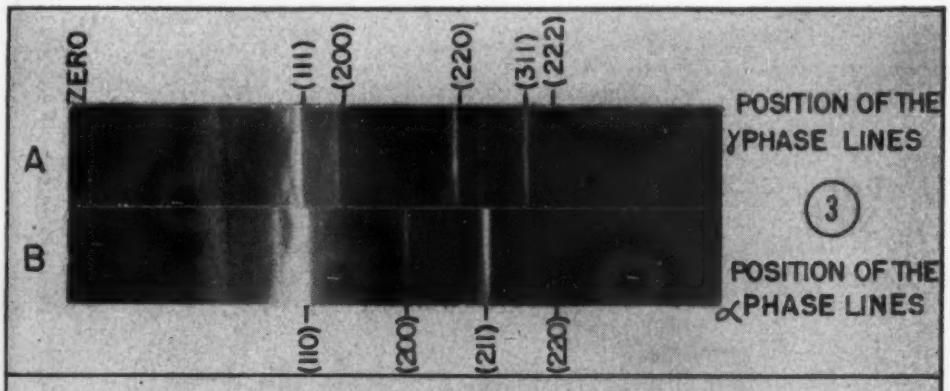
It is also very curious to find reductions in excess of 82 per cent reduced the hardness. Several possible reasons for this dropping off were given in the discussion of the previous paper. Aside from mechanical fissures, alterations in the sub-boundary structure also play a part; this possibility must not be overlooked.

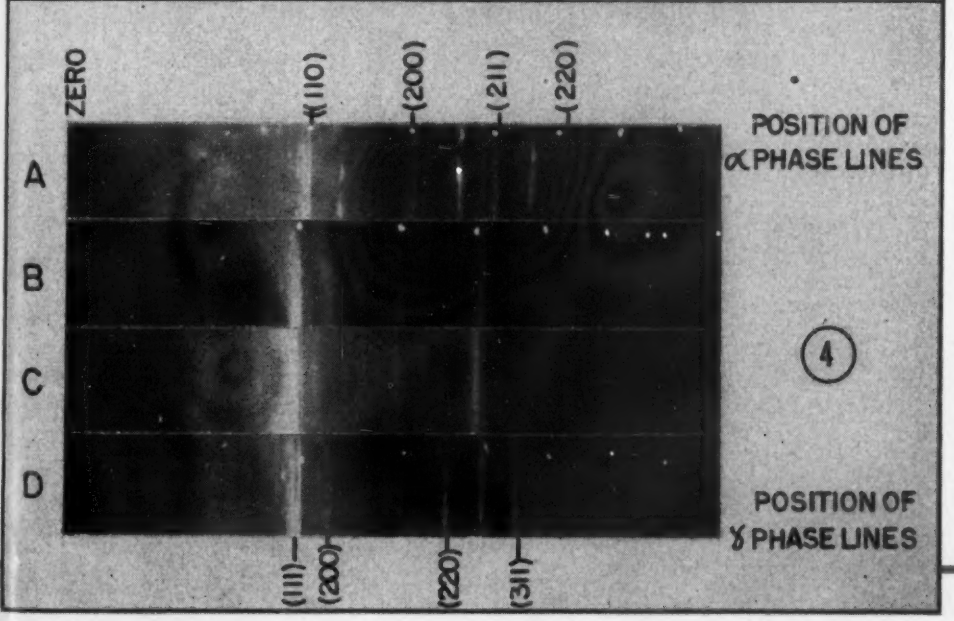
This viewpoint is also consistent with the generally accepted ideas of factors believed to control the hardness of metals, for it is generally accepted that the larger the microscopic grain size, the softer the metal will be, and likewise, the smaller the grains, the harder the material.

Now when the ultimate resolving power of the microscope is reached, we can no longer follow structural changes which are taking place within the grains, and so we must resort to other means of examination. One of the best methods developed up to the present time is the x-ray diffraction method. In a sense this makes it possible for us to follow alterations in the grain structure beyond the range of the microscope.

Now let us see what the x-ray method is able to tell us that the microscope cannot.

Experimental x-ray evidence was presented[8] to show that cold working could only reduce the mosaic elements to a limiting particle size, irrespective of the magnitude of the deformation. For pure iron the mosaic elements were quite large, while for Hadfield manganese steel they were very much smaller. In other words this so-called limiting particle size is something quite characteristic of the material, just as the grain size determinations under the microscope are real and significant.





In the case of the microscope one can see the difference while in the case of the x-ray method it must be determined indirectly. However, the mosaic element is just as real as the electron. No one would dare question the existence of electrons yet we can only measure them by indirect means. We know all about them and yet no one nas ever seen one.

Reason the mosaic theory of sub-boundary structure has never developed as it should is simply due to the fact that it is not a generally accepted metallurgical theory. Several years ago very little was ever mentioned about the mosaic theory, but today the literature is more abundant[9].

In this article the mosaic theory is considered as an accepted thing but about which a great deal more remains to be learned. The mosaic concept will be used to explain some of the changes which take place when these Hadfield steels are subjected to various heat treatments and plastic deformation.

(*Please turn to Page* 117)

MACHINE TOOL SHOW

MACHINE tool industry without doubt held the most successful show and technical congress in its history. For weeks and months to come, millions of words will be written, thousands of reports will be compiled and hundreds of speeches will be delivered, on the engineering, production, economic and human significance of the National Machine Tool Show.

This exposition, worldwide importance of which was indicated by presence of hundreds of foreign visitors ranging from Scots in Harris tweeds to turbaned East Indians, rolled up attendance records, during the 10-day run, which totaled far in excess of the 100,000 originally estimated by the National Machine Tool Builders' Association, which sponsored the big show and the Machine Tool congress, which with the series of outstanding technical meetings paralleled the show.

Up to closing time of the show late Friday afternoon, Sept. 26, reports continued to materialize of substantial orders—probably totaling several millions of dollars—actually booked by machine tool builders at the show, including a goodly number of exhibition machines themselves sold for immediate delivery "off the floor" of the Dodge-Chicago plant. Indications are the impact of this show will knock loose a great deal of business temporarily held up in expectation of the show, as well as stimulating a lively flow of entirely new business. The combined results should make 1947 a rather satisfactory year for the machine tool builders, as well as getting them off to a good start in 1948.

If the quality of salesmanship involved in "following up" on the show is of the same high caliber and vigor as that practiced by the industry throughout the entire period of the show, the above prediction for 1948 should be good for the entire year—not merely for its beginning.

Leaders of the industry are emphasizing the fact that only through such able and vigorous follow up campaigns can the heavy investment in the show itself be made to pay the handsome dividends which it is potentially capable of paying for a long time to come. They urge that the cost of the show be considered as a long-time, long-term investment, rather than mere pouring of a lot of money over the dam like a flash flood.

Aside from pointing out that the most vivid overall impression gained at the big show is that human beings from now on no longer are going to be called upon to engage in physical or mental drudgery from which modern machinery can relieve them, this article will not delve into the detailed significance of the

Fig. 1—In Chicago, over 100,000 persons visited the huge Dodge-Chicago plant, scene of the 1947 National Machine Tool Show. View shows crowd inspecting some of the 2000 machines exhibited

Fig. 2—American Machine Tool Distributors Association get-together at Hotel La Salle, Sept. 15. Meeting, which was integrated with the Machine Tool Show, was one of the largest annual sessions in the 23-year history of the organization

Fig. 3—Registration section of the big show where those who did not register in advance received proper credentials

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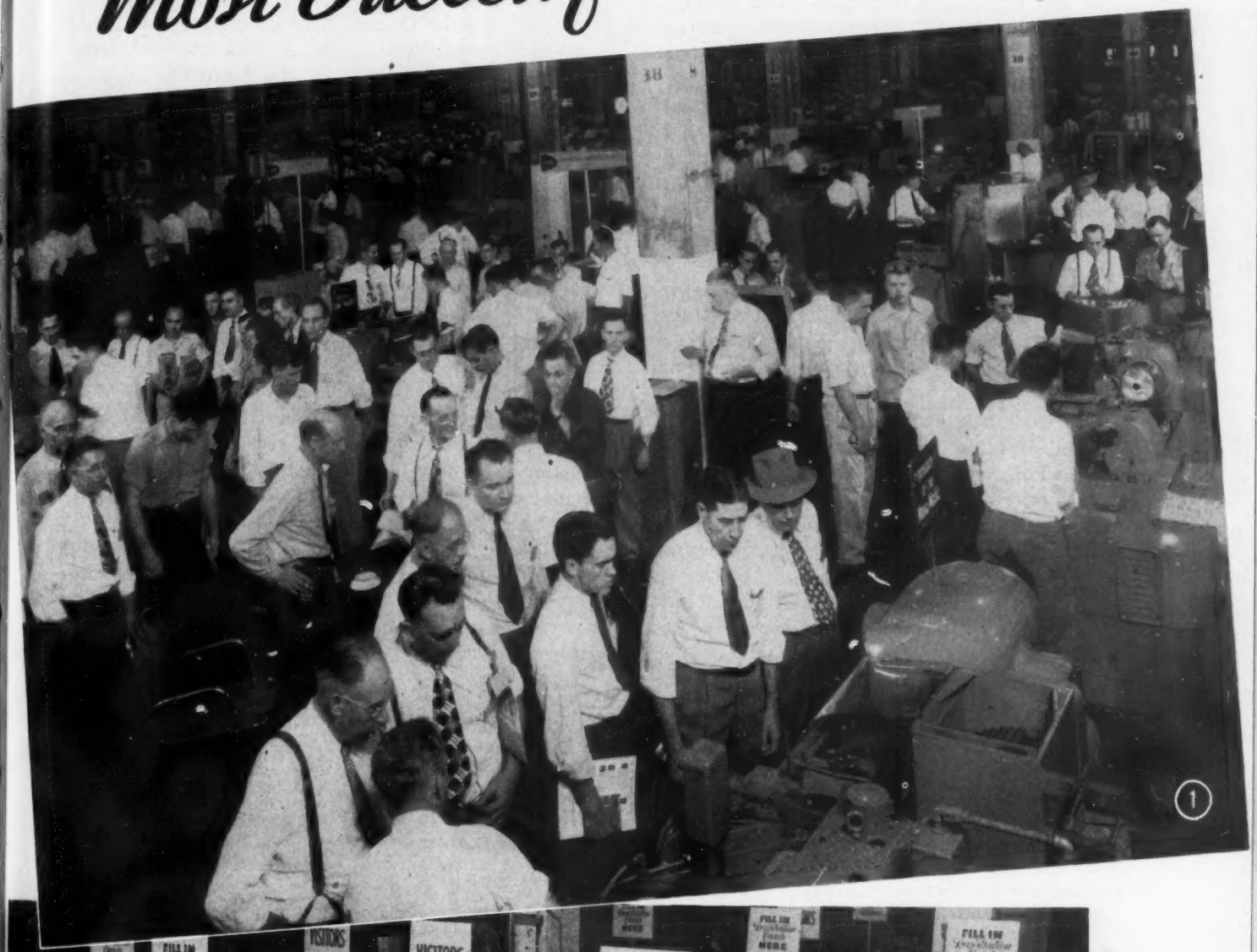

hundreds of new and improved designs revealed at the Dodge-Chicago plant. That will be reserved for articles in later issues, after careful analysis of notes taken at the show. Rather, this article is concerned with the current American industrial scene as reflected by addresses delivered by recognized authorities who were the spokesmen for the leading industrial associations and engineering societies which participated in the Machine Tool Congress activities. These also reflect a picture of the show in true perspective.

Mass production of irregular contour parts to an accuracy of 0.0001-inch at lower cost now is practical through improvements in the art of crushed wheel grinding, declared J. C. Wilson, chief engineer and sales manager, Thompson Grinder Co., Springfield, O., before a dinner session of the American Society of Mechanical Engineers at Continental Hotel, Sept. 18.

Some of the improvements are longer wheel life through better coolants, porous grinding wheel structure and better bonding; improved method of re-establishment of work roll contours by shaving dies, and machinery designed to the special requirements of crush grinding.

Mr. Wilson said that in most cases any piece that can be hobbed or form milled can be crush ground. Generally speaking, any material that can be satisfactorily surface ground, also can be crush ground. Although limitations are somewhat similar in crush grinding additional factors such as shape, depth, balance of contour and material apply.

An indexing type of grinding machine is now under construction to finish an automotive housing directly from the rough forging. This operation will remove approximately 1/16-inch of metal with superior surface and at a cost reduction over the old boring method. The machine is designed so that wheel redressing will be entirely automatic.

At the same ASME session, James F. Lincoln president, Lincoln Electric Co., Cleveland, said that more arc welded steel is being used in machinery structures every day due to the flexibility of the process, lower cost, greater strength, uniformity and general ease of manufacturing.

Although benefits of cast iron are well known, many designers fail in their redesigns from cast iron to welded steel because they lack knowledge of the fundamental approach to the design of welded steel components. One of the big mistakes that designers make is to take a blue print and redesign directly from the casting rather than set up the functions and then design the welded steel structure around it, Mr. Lincoln said.

In discussing the objection raised by designers that steel will vibrate, Mr. Lincoln said that it is true that cast iron has greater dampening capacity than steel. "This means," he said, "that after a force has started a vibration in cast iron the vibration will die out faster than it will in steel.

"However, this does not take into consideration that the vibration in steel is of lower amplitude than

Fig. 4—One of the early vistors at the show was Gurbachan Singh, supply officer, Government of India, Supply Mission, Washington. He is shown here with F. J. Fields (left) vice president and general manager, Sidney Machine Tool Co., and Harry Czerwonki, Washington representative of the same company

Fig. 6—William J. Morgan, (left) secretary, British Machine Tool Trades Association, London, who headed a large delegation from Great Britain, is shown here visiting with John E. Lovely, vice-president and chief engineer, Jones & Lamson Machine Co., and Tell Berna (right) general manager of the National Machine Tool Builders' Association

Fig. 7—Weighing 48 tons and standing 15 feet from the floor, this big Pratt & Whitney Tracer-controlled milling machine cuts iron and steel dies used for stamping large automobile and refrigerator parts. It can cut a die 5 feet high, 10 feet wide and 18 inches thick. In operation, a plaster model on top is followed by an electric tracer and cutting tool below which reproduces the form in the steel or iron casting

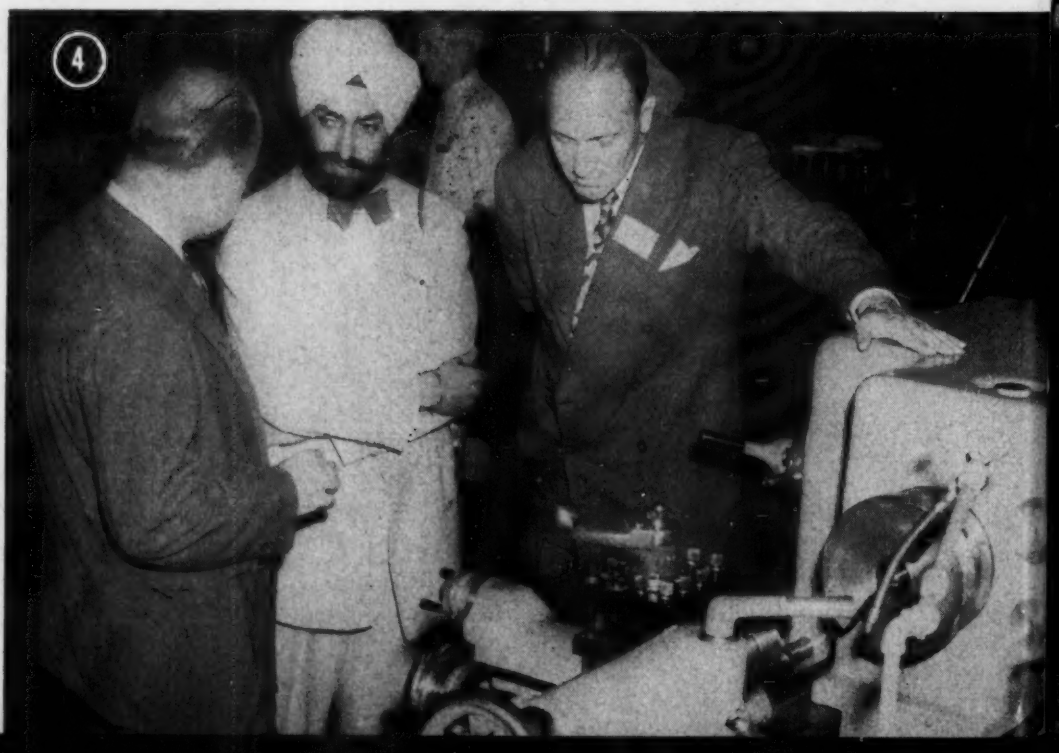

Fig. 5—Herbert H. Pease, president, New Britain Machine Co., New Britain, Conn., and president, National Machine Tool Builders' Association, presided at the preview dinner in ballroom of Hotel Stevens, Chicago, Sept. 16. This marked opening of the show

cast iron. This means there is actually less deflection and, steel being a stiffer material, takes greater force to make it vibrate. Once the vibration is set up in steel it does vibrate a longer time which makes it more susceptible to harmonics. This becomes a function of the shape of the part and, any difficulty that is encountered with harmonics, which is very rare, can be corrected by merely placing a stiffener at the point of maximum intensity, or changing the section. (*Please turn to Page* 96).

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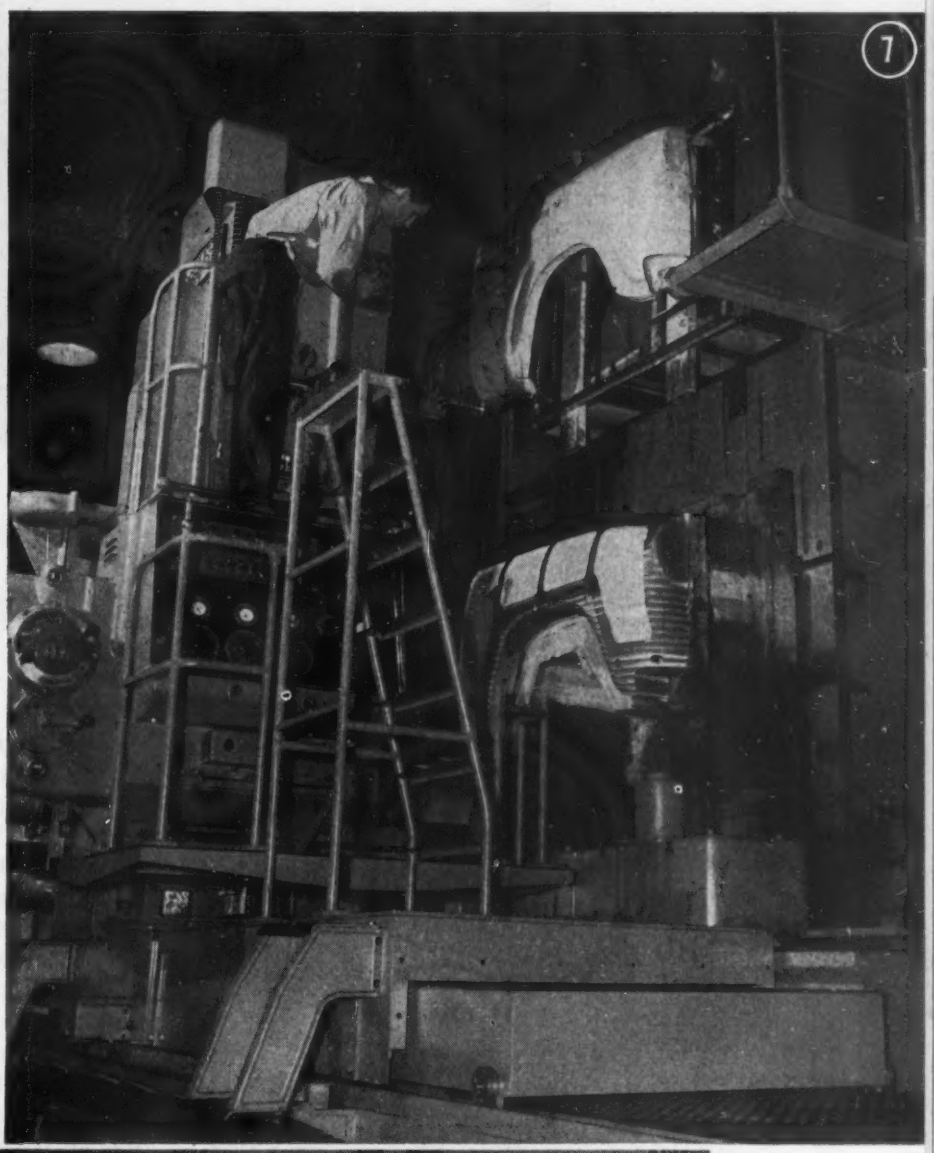

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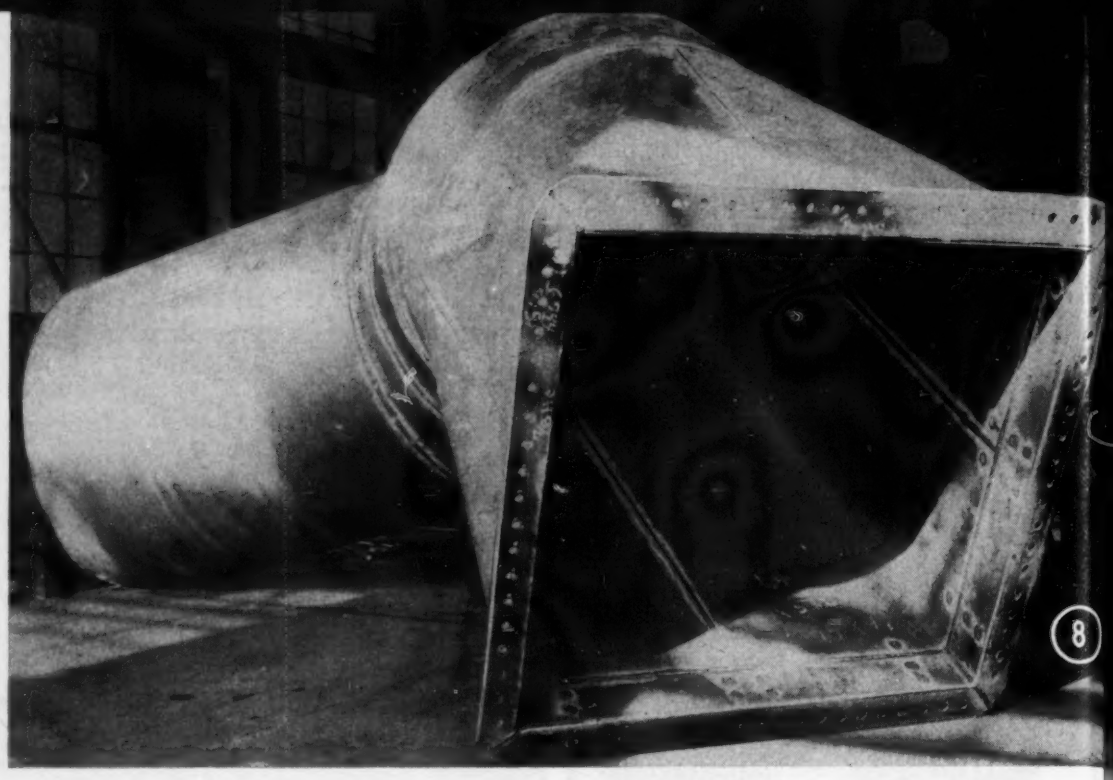


Fig. 8—Dust catcher and pipe fabricated from abrasion resisting steel using lime-ferritic electrodes

Fig. 9—Idealized S-curve for 0.80 per cent carbon steel, depicting relation between transformation temperature and nature of product

Fig. 10—Five per cent chromium, ½ per cent molybdenum (type 502), annealed. Austenitizing temperature 1650° F, critical (A_c1) temperature—1475° F

Welding Hardenable S

By ORVILLE T. BARNETT
Division Engineer Electrode Division
Metal & Thermit Corp.
New York

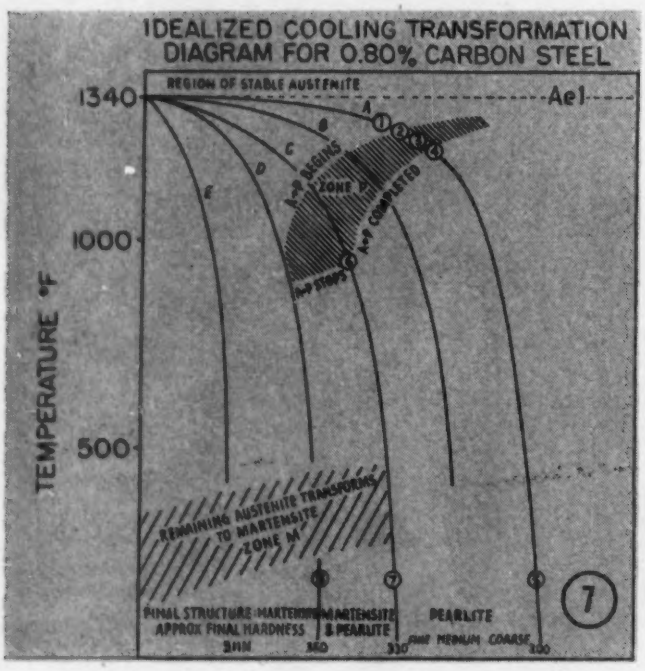


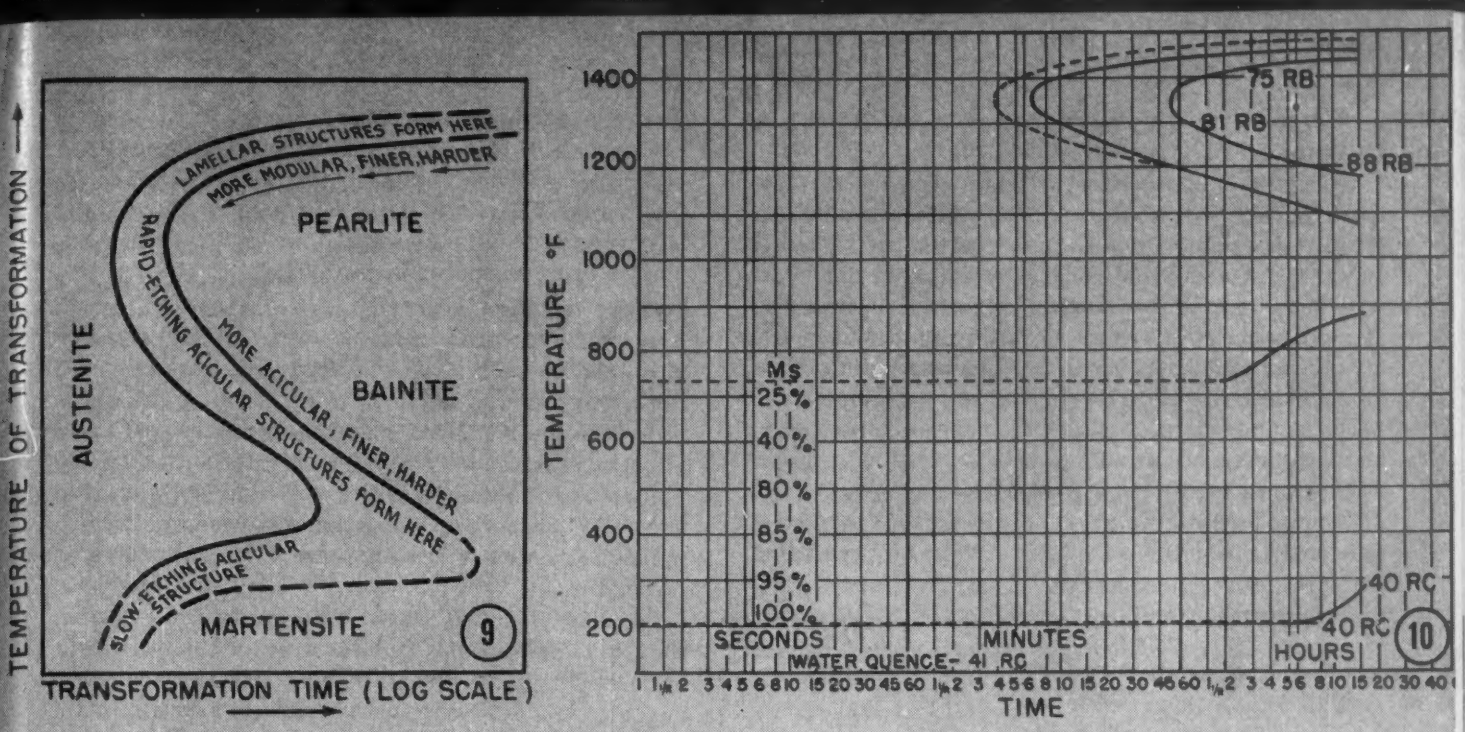
Fig. 7—Final structures of heat affected zones resulting from different cooling rates

IN the first part of this article, the welding of hardenable steels was considered by following the Lehigh method. This system was chosen because it enables the welding engineer to get some specific answers to the response of a particular steel to the welding conditions that he should establish for proper qualities of joint. Other metallurgical considerations will be discussed here.

S Curves: In Fig. 9 an idealized S curve for an 0.80 per cent steel is presented. The S curve (name comes from the general S form of the curve) might be thought of as a road map for driving through the various steel formation areas. From the S curve, which applies very well to the cooling of the heat affected zone of a weld, one can learn the mechanics of transformation.

Keeping in mind the analogy of cooling rates in a welded joint as compared with cooling rates in hardenable steels being heat treated, the relationship of welding practice to the S curve can be evaluated. In welding, as a general rule, considerable effort is expended to assure slow enough cooling to avoid the formation of martensite. Or if martensite, which is a hard, brittle and readily cracked formation, cannot be avoided, the second approach is to form martensite as slowly as possible. A more detailed discussion of martensite formation will be presented later in this study.

The two co-ordinates of the S-curve are temperature of transformation and time of transformation which, in Fig. 9 apply to transformations that take place at constant temperatures. At the top of the S curve where lamellar structures form, very slow cooling



Steels

In this second and concluding part of the two-part article the author discusses S curves in learning the mechanics of steel transformations, relation of martensite formation to preheat, interpass temperature and postheat treatments, and use of lime-ferritic low hydrogen electrodes

rates produce soft coarse pearlite. The name "pearlite" comes from the pearly lustre of the laminated material on microscopic examination.

Pearlite consists of alternate layers of ferrite (pure iron) and iron carbide (Fe_3C). Thus the austenite (high temperature, nonmagnetic, form of iron containing carbon up to 1.7 per cent in solution) transforms in a sufficiently long time at a high enough temperature to pearlite in which the ferrite contains a maximum of 0.04 per cent carbon with the rest of the carbon in the form of iron carbide.

As we cool the heat affected zone of this 0.80 per cent carbon steel to lower temperatures, the transformation product changes from pearlite to bainite. Bainite is harder than pearlite and softer than martensite. Bainite is a combination of ferrite and carbide which is acicular in structure, with a finer crystal structure than is found in pearlite.

Finally, at the bottom of the S curve in a region where dashed lines show that some of the unknown remains to be explored, a third type of austenitic transformation takes place. This structure is martensite which under the microscope reveals a needle-like acicular structure and in which the carbon has been trapped due to rapid cooling to form hard and brittle material. Although martensite is quite useful to the toolmaker and in heat treating practices where hard structures are developed and subsequently tempered, it is a formation that should be avoided in welding operations.

Perhaps a better way to achieve a good basic understanding of the application of S curve to the final structures of heat affected zones resulting from different cooling rates is through a study of Fig. 7, which for the same 0.80 per cent carbon steel shows what happens when different rates of cooling exist as in the curves A, B, C, D and E. All of the curves start in the region of stable austenite shown at 1340° F and are followed as the temperature decreases with increasing time.

Curve A represents slow cooling; at point 1 the material is still austenitic. At point 2 the carbon begins to separate from the austenite and establishes a condition in which the material is almost all austenitic but where small amounts of ferrite and carbide are beginning to form. At point 3 the transformation is half completed and the structure is 50 per cent austenite and 50 per cent ferrite plus carbide. As the heat affected zone continues to cool to point 4, the last traces of austenite disappear, leaving ferrite and carbide. Cooling rate in curve A is quite slow and when point 5 is reached, microscopic examinations show coarse pearlite with a brinell hardness of about 200.

Similar changes take place along curve B, although this time medium pearlite is formed and the brinell hardness may be about 265. Curve C follows the same pattern and at point 7 results in fine pearlite with a brinell hardness of 330.

Between curves C and D, a mixture is found in the final product. Not all austenite transforms in the limited time at higher temperatures, leaving some austenite to transform to martensite at around 200 to 300° F. The structures become increasingly hard, and brittle. Curve D finally misses the austenite to pearlite transformation altogether and the resulting

structure is wholly martensite at point 8 with a hardness of 350 brinell.

Still greater hardnesses of martensite become possible. Martensite forms at definite temperatures and when the cooling rate is such as to avoid the austenite to pearlite transformation, it is anticipated that martensite will form. Now martensite that is formed slowly enough may not crack. It will be hard and brittle but sound and amenable to a tempering action. Martensite that forms too quickly, as in curve E, will be harder and more brittle. Even more disturbing is the possiblity of internal cracks in the martensite. Such cracks might enlarge in service.

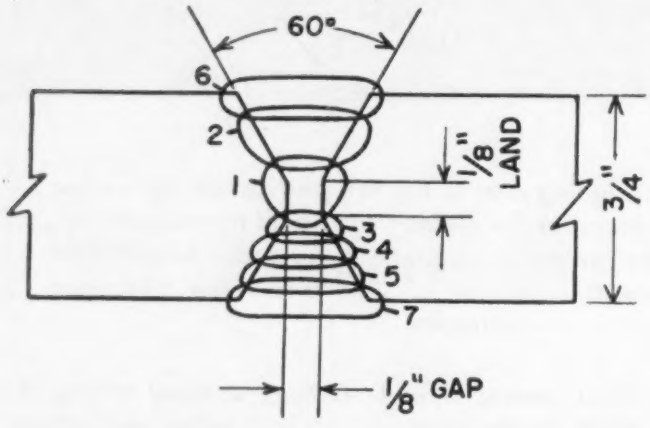
Before leaving the study of S curves, to review martensite formation in relationship to preheating and postheating practices, the part played by carbon and alloying elements in the location of the S curves merits some attention. Curves selected for Fig. 9 cover an 0.80 per cent carbon steel. Materials of such high carbon content are welded rather infrequently. They are sometimes joined by welding, however, as will be shown in one of the actual examples to be presented in section IV.

Curve in Fig. 9 at the high carbon content is well positioned for study. Lower carbon contents move the curve to the left. If they move the curve far enough to the left, the upper part of the curve runs into the left hand margin. This is a good situation because the only possible transformation during cooling is to ductile pearlite. And this is the reason why very low carbon unalloyed steels may be welded without any risk of cracking due to hard martensitic formations.

Alloying elements, like carbon, move the curve to the right. This means that the nose of the curve will be missed by many practical heat affected zone cooling rates and that martensitic structures are virtually unavoidable. Fig. 10, which covers 5 per cent chromium 0.50 per cent molybdenum steel shows the shifting of the transformation curve nose to the right quite clearly.

As all welding engineers who have thought at all about the welding of these type 502 steels realize, all practical cooling rates will result in martensite formation. For this reason, type 502 steels must be preheated and must be heat treated without losing the preheat and interpass temperature. If these precautions are observed, cracking is quite improbable.

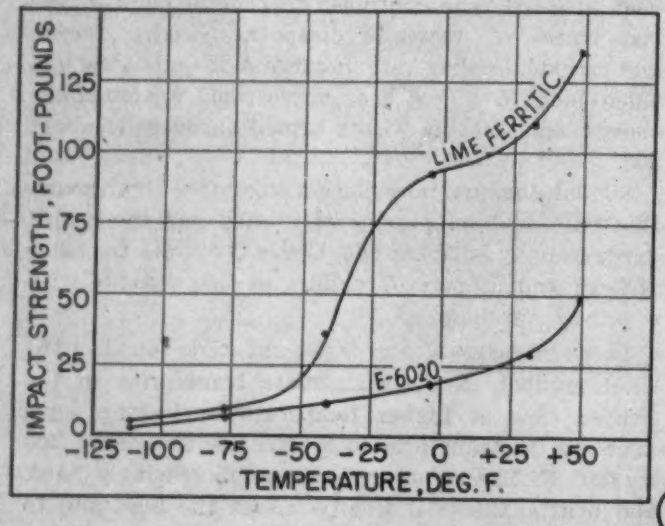
Formation of Martensite: Martensite formation is related directly to preheat, interpass temperature and



PASS	AMPERES	VOLTS
1	150	22.0
2	190	23.0
3	190	23.0
4	190	23.0
5	190	23.5
6	190	23.5
7	190	23.5
FINISH EDGES	170	23.5

(11)

ELECTRODE - 5/32"
MANGANESE MOLYBDENUM
LIME FERRITIC
NO PREHEAT
INTERPASS TEMPERATURE
500° F AT 5TH PASS.



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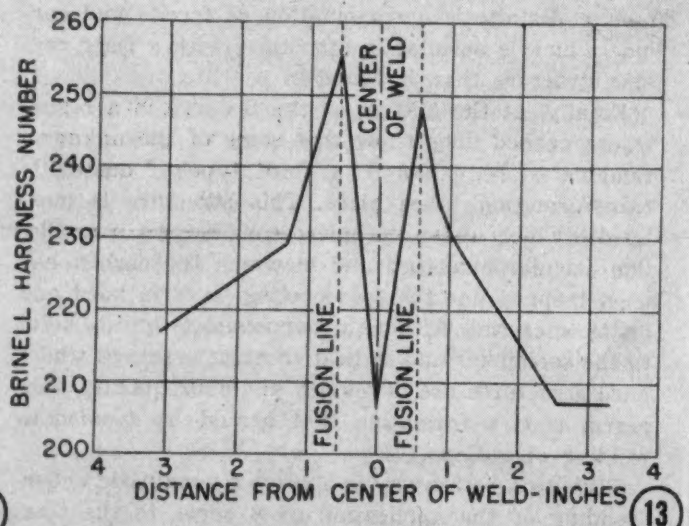


(13)

post heat treatments. Of course, considerable emphasis has been directed to the hard and brittle structure of martensite itself. Such a state of affairs is bad enough but there are superimposed upon these two bad qualities of martensite other considerations which are troublesome, too.

One of these has to do with hydrogen in the weld and in the heat affected zone. Hydrogen is formed from the electrode coating and is found in all types of electrodes whether they contain cellulosic, rutile or all-mineral coatings. The only exceptions are the lime-ferritic low hydrogen coating types.

During the welding operation, except when the E6015 (low hydrogen) type electrode is used, the hydrogen from the coating goes into solution in the weld metal and diffuses into the heat affected zone. Since the weld metal is often of lower carbon and alloy content than the parent metal, the presence of hydrogen in the heat affected zone is probably the most important consideration.

On cooling, the heat affected zone changes from austenite to martensite. Hydrogen is much less soluble in the martensite than in the austenite. Thus the hard and brittle martensite which may already be under considerable stress has added to it a considerable hydrostatic pressure created by the gas being rejected from solution as the martensite forms. This gas pressure is great enough to produce cracks in the martensitic heat affected zone.

Another difficulty, this is particularly true of steels containing 0.40 per cent and more of carbon,[3] is introduced through the differential expansion and contraction of the martensite and the austenite during cooling. As the martensite is being formed on cooling, it actually expands at first. Meanwhile, the internal austenitic structure continues to contract.

By way of a homely example, the situation is analogous to a baseball in which the horsehide cover would be getting larger while the string-wound interior would be shrinking. Assuming further that the cover was attached to the string wound interior by glue, it is understandable that this glue would have to crack and fail. Similarly, the expanding martensite on the outside is in conflict with the contracting austenite on the inside of the steel piece and this differential stress may cause cracking. Of course, time is an important factor in this change. If the change is made slowly enough, there is little difference in expanding martensite and contracting austenite and no stress failures would be expected.

In the first part of this discussion of the welding of hardenable steels, the factors involved in the heat balance were discussed rather empirically. Now it seems advisable to consider a specific example of a deep hardening steel such as type 502 to see what the welding problems may be. In Fig. 10, type 502 steel (5 per cent chromium, 0.50 per cent molybdenum) offers a good example of a material with a bad reputation for cracking, which can be used to study the matter of preheating, interpass temperature and possible heat treatments.

First there is the question of selecting preheat temperatures which for this steel are generally given as a minimum of 500 or 600° F. Take the revised Payson-Savage formula for the initiation of transformation to martensite as an approximate guide in this problem:

$$\text{Ms in } °\text{F} = 930 - 540\,(\%\ \text{C}) - 60\,(\%\ \text{Mn}) - 40\,(\%\ \text{Cr}) - 30\,(\%\ \text{Ni}) - 20\,(\%\ \text{Si} + \%\ \text{Mo})$$

Applying this formula to the steel in Fig. 10 gives a temperature of 605° F, which is below the Ms point in Fig. 10. This may be explained by the sluggish transformation in high chromium hardenable steels. If all of the chromium and carbon did not go into solution in the austenite, the Ms point would be higher than that calculated.

TABLE VIII

AS WELDED PHYSICAL PROPERTIES OF 3/16" E6010, LIME-FERRITIC AND E6020 ELECTRODES

Property	E6010	Lime-Ferritic	E6020
Yield Strength, psi	52,750	59,750	54,550
Ultimate Strength, psi	55,750	69,250	66,650
Elongation, % in 2"	28.1	31.7	27.7
Reduction of Area, %	55.6	73.5	55.1
Charpy Impact Strength (ft./lbs.)	55	133	48

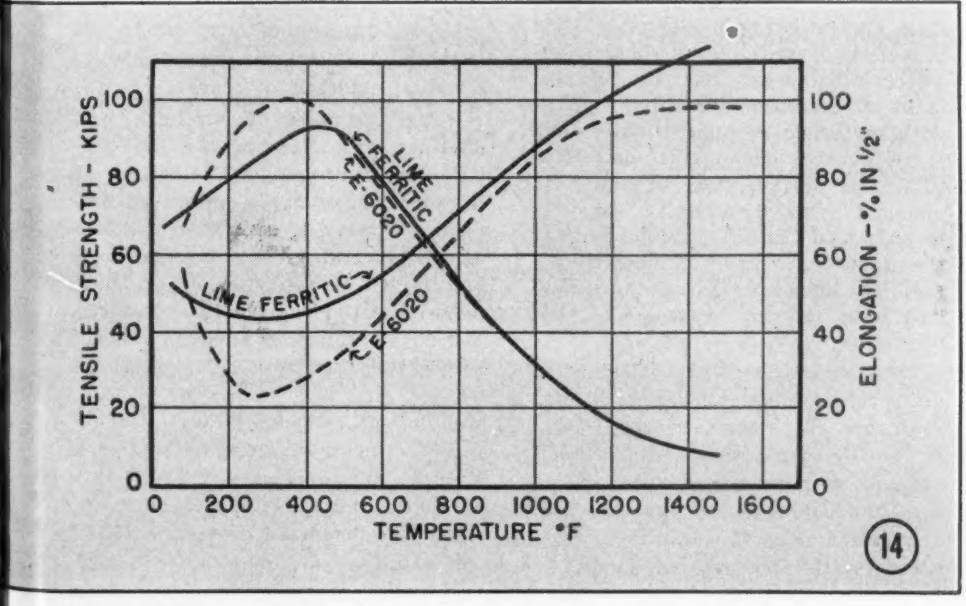


Fig. 11—Acceptable procedure for welding drill stock

Fig. 12—Impact strength of lime-ferritic and E6020 weld deposits as influenced by tempature. Charpy specimens with Izod notch

Fig. 13—Hardness exploration of welded drill bits

Fig. 14—Effect of elevated temperatures on strength of lime ferritic weld deposits

However, purpose in listing this formula is to enable the welding engineer to calculate this important point as a rough guide to preheating temperatures.

Continuing with the type 502 steel, a preheat temperature of 600° will be adopted. Also, because difficulties might be encountered if the weld area were permitted to cool below this temperature, means will be provided to maintain a minimum interpass temperature of 600° F and, recalling the usual instructions for welding this steel, post heat treatment will take place immediately after welding and without allowing the material to cool below 600° F at any time.

The foregoing paragraph gives the usual instructions. Why must this practice be followed? Assuming that the weld is made in 2 hours and that the weldment is then allowed to cool to room temperature, Fig. 10 shows that a wholly martensitic structure would be reached when the material dropped to 200° F and that the usual troubles with cracking might be expected. At a 600° F preheat and interpass temperature level, some martensite may form, possibly the 40 per cent suggested in Fig. 10, but this hard and brittle martensite is in a soft and ductile austenitic matrix. This might be an analagous situation to the tungsten carbide particles that are held in a softer steel matrix in certain hard facing materials used for wear resistance.

For the postheat treatment, it is desirable to secure a soft pearlitic structure. To achieve this result, material is brought to a uniform temperature of 1375° F. After about 7 minutes at this temperature, the austenite begins to transform to pearlite. In somewhat less than 1 hour, the whole structure has become pearlitic and further cooling can proceed at a normal stress relieving rate of about 325° F per hour.

Since, however, this subject is being treated only to show the principles involved without paying strict attention to certain metallurgical niceties that are frequently involved, actual practice might suggest holding at 1375° F for 2 or 3 hours rather than 1 because the austenite may not have been fully transformed in the original heat treatment. Details such as these are left to the individual welding engineer who wishes to consult the original references in order to get the precise metallurgical considerations involved.

Lime-Ferritic Electrodes: Within the past year and a half to 2 years, the introduction of lime-ferritic low hydrogen electrodes has revolutionized thinking in many welding activities involving hardenable steels. Already, many of the practical applications of these electrodes in everyday production welding have been in field service long enough to prove their worth.

But the welding engineer wants to know what specific reasons exist for the selection of the lime-ferritic electrodes for welding the hardenable steels. It is not enough to know that these electrodes work. Why they do so is equally important.

To understand this question better, an examination of the physical properties of the lime-ferritic electrodes seems to be in order. These physical properties compared with the properties of E6010 and E6020 electrodes in the as welded condition are reported in Table VIII.

There are several points worthy of note in the physical properties of the lime-ferritic electrodes as compared with the other two more familiar types. Strengths, both yield and ultimate, are higher and at the same time ductilities, both elongation and reduction of area, are higher. Usually it is expected that the ductility is impaired when strength increases with materials of approximately the same general chemical composition. That this normal state of affairs is changed with lime-ferritic deposits is an added bonus. And looking at the impact strengths, a marked superiority shows up for welds deposited with the low hydrogen coated electrodes.

With an increasing interest in low temperature applications, it is natural that the situation with regard to impact strength of lime-ferritic deposits as temperatures decrease to zero and below should have been investigated. Fig. 12 shows these data. Lime-ferritic electrodes maintain good impact properties exceeding the usually accepted engineering standard of a minimum of 15 foot-pounds at −50° F. The E6020 weld deposits on the other hand are above 15 foot-pounds at 0° F, but show a continued deterioration in impact strength as the temperature drops below this figure.

If the physical properties already studied were the only advantages possessed by the lime-ferritic electrodes, it would be expected that these new electrodes would enjoy a widespread popularity because they combine quite advantageous physical properties with x-ray sound weld deposits. But they are more resistant to cracking than ordinary mild steel electrodes. Fig. 14 demonstrates this in terms of the effect of elevated temperatures on the strength and ductility of lime-ferritic as compared with E6020 weld deposits.

Note that special tensile specimens were used in this investigation and that ductilities are reported in terms of per cent elongation in ½-inch. Still the values are relative and at the lowest ductility point which occurs in the neighborhood of 300° F for both types, the lime-ferritic weld deposits are almost twice as ductile as those from the E6020 electrodes.[4]

In the "blue-brittle" range, there is a definite advantage in the ductility characteristics of the lime-ferritic electrodes. Practically, these electrodes produce weld deposits that have inherently greater resistance to cracking than the other mild steel types. This does not mean that the lime-ferritic weld deposits are crack-free because such welds under conditions of severe restraint are liable to crack just as any other weld deposit subjected to similar exceedingly severe stress conditions. But the ductility advantages of the lime-ferritic weld metal have proven themselves by a consistent freedom from cracking in applications where all other mild steel types succumbed to a virtual epidemic of cracks.

Better balance of strength and ductility properties of the lime-ferritic low hydrogen weld deposits at normal temperatures, improved impact resistance of such weld deposits at normal and subzero temperatures and higher ductility levels of these deposits are all attractive features. Yet these properties alone cannot account for the growing interest in lime-ferritic weld deposits. In the welding of hardenable steels the almost complete absence of hydrogen supplies the necessary missing link in the popularity chain.

As was discussed in section III of

(*Please turn to Page* 114)

TABLE IX

ANALYSIS OF DRILL STOCK

Carbon	.80—.90
Manganese	.20—.30
Phosphorus	.04 Max.
Sulphur	.04 Max.
Silicon	.20—.30

TABLE X

ANALYSIS OF ABRASION RESISTANT STEEL

Carbon	0.35—0.50
Manganese	1.50—2.00
Phosphorus	0.050 Max.
Sulphur	0.055 Max.
Silicon	0.15—0,30
Copper	0.20 (may be used)

TABLE XI

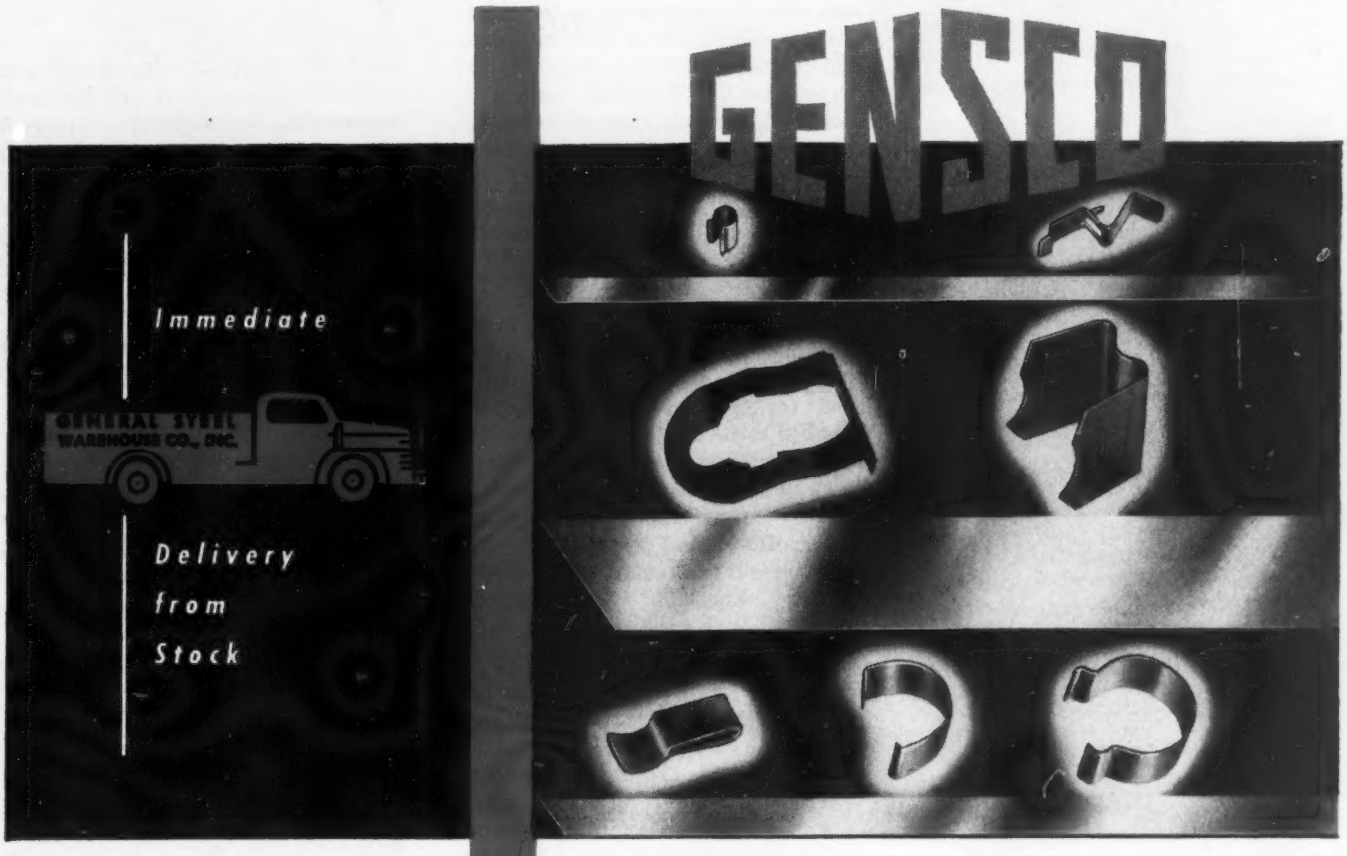
TYPICAL CHEMICAL PROPERTIES OF TYPE 8015Q DEPOSITS

Carbon	.09
Manganese	.80
Phosphorus	.019
Sulphur	.018
Silicon	.18
Nickel	2.09
Molybdenum	.45

Again in Stock

ANNEALED SPRING STEEL

.70-.80 CARBON • .90-1.05 CARBON



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Engineering News *at a Glance*

LOCOMOTIVE-BUILD: Built like a locomotive, one of the latest hydraulic flash welders built by Thomson Electric Welder Co., Lynn, Mass., provides a 25-ton bite and a 10-ton squeeze. It includes a motor and pump that supplies 20 gallons per minute flow at 1000 pounds pump pressure. In addition, a special solenoid-operated low pressure starting valve shifts to high pressure after motor reaches full speed—to prevent stalling. The welder's transformer is rated at 300 kilovolt amperes at 50 per cent duty cycle.

NO END TO RESEARCH: Lately included among several pieces of massive German industrial equipment shipped to this country by the Bureau of Mines to help obtain oil and gasoline from coal, was a giant hydrogenation-process converter weighing 130 tons. Sixty feet long and cylindrical in form, with a maximum diameter of 7 feet, the unit was unloaded from the ship by removing all standing rigging on the after starboard side to make way for marine derricks. A special heavy-duty flat car—one of the only six in the United States—was moved to New Orleans from Chicago to carry the converter to the Missouri Ordnance Works, scene of a synthetic fuels demonstration plant. During the war, unit was used to produce synthetic liquid fuels for Nazi forces.

EMBOSSED-SPOKE WHEEL: In St. Louis, Accurate Model & Engineering Co. uses an embossed-spoke construction in manufacturing its latest model rubber-tired steel wheels. Fabricated especially for builders of portable equipment and wheeled toys in 4 and 8-inch sizes, the wheels are reported to provide exceptional strength in relation to size due to the novel construction. Flared seamless tubing is used for sleeve bushings, and add further strength to the spot-welded steel plates of the wheel.

STAINLESS FOR PAINT BASE: Stainless steel powder base paint, using a spar varnish or lacquer vehicle is now being made available commercially, it was learned recently from John D. Dale, president, Charles Hardy Inc., New York. He revealed that a number of leading paint makers are now engaged in testing physical qualities of stainless steel powder base paint, and results of these tests should further expand availability of stainless base paint to distributors. The material is furnished in paste form which, when mixed with any commercial vehicle, will render a surface highly resistant to such corrosive agents as nitric, phosphoric or sulphuric acid fumes or other strong chemicals.

SAM TOUR AWARD: An award of $1500—contributed by Sam Tour, president, Sam Tour Inc., New York—was recently established as an incentive to undertake research on corrosion testing, and to stimulate the preparation of technical papers in this field, it was learned from the American Society for Testing Materials, Philadelphia. Rules of the award and pertinent information concerning it may be obtained from the society.

SYNTHETIC WEATHERING: In the Bessemer avenue plant of Arco Co., Cleveland, a weathering machine is used to test finishes the company supplies to its customers. In 3 weeks here, a coating may be tested under the same weather beating which it would receive in a year's exposure under subtropical conditions. The machine subjects finishes to strong electric "sunshine" and periodic "rain".

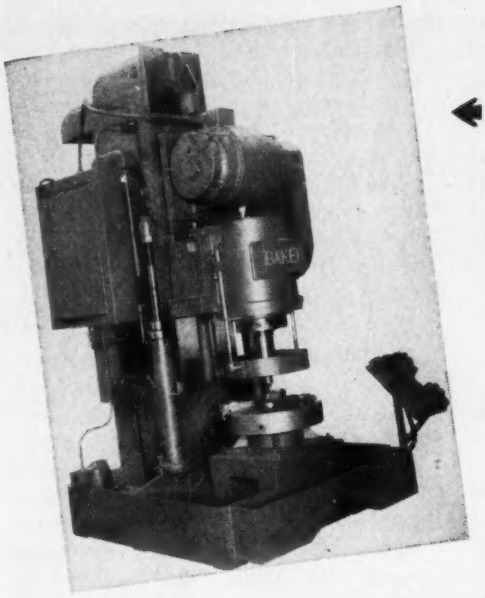
RETAINS LEVEL: Latest use discovered for granite block is to produce more accurate patterns, Herman Stone Co., Dayton, O., reports. When used as a base in casting plaster molds the hard granite stone remains perfectly level over a long period without changing shape due to temperature or moisture.

EXPEDITES STEEL SHIPMENTS: Trucking invention, developed by Harold Nixon of Hollywood, Calif., may solve one of the most vexing problems of motor truck operators and steel makers who ship steel by trucks—that of waiting for steel to cool enough so it may be loaded safely. It is a new type truck and trailer bed which, according to the inventor, enables steel plants to give customers faster service, saves cost of steel storage and cooling space and of new blocking. It consists of a steel floor with some inset mechanical blocking. The latter may be lowered to provide a perfectly flat bed, or may be raised and set on the floor as cross members, or arranged lengthwise. Blocks are faced with a material similar to that used for auto brake linings. This resists heat and wear. They also are perforated to allow circulation of air under the load to permit cooling. The device, it is said, enables steel as hot as 400 to 500° to be loaded immediately—a factor which at present delays loads some 10 to 12 hours. Air circulating under the load cools the steel while enroute, and speed of truck carries heat away from the operator.

SIZE NO PROBLEM: Ceiling-mounted infrared oven used by Hotstream Heater Co., Cleveland, enables small-parts painting to be centralized in one booth, relieving congestion and freeing floor space. The oven, supplied by Wagner-Green Co., contains 500 lamps with a full load rating of 125 kilowatts. These are connected on ten circuits, making it possible to adjust them in accordance with size work and drying time required for the paint applied.

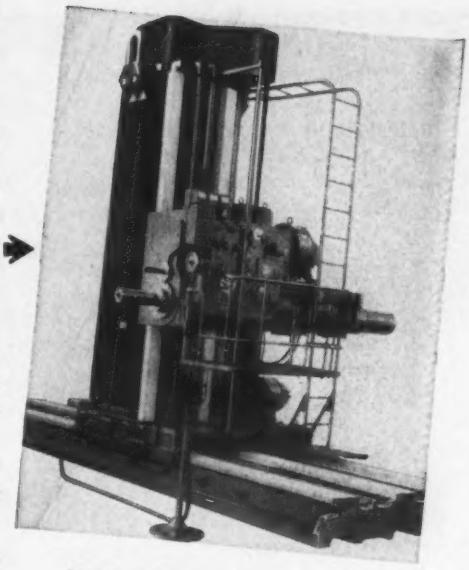
HOLDING POWER PLUS: Tremendous holding power is assured, and use of smaller screws in many applications is made possible by a plastic expanding anchor currently manufactured by Holub Industries Inc., Sycamore, Ill. Suitable for use with metals and many other materials, development obtains its holding power from its overlapping internal and external slits that give a concertinal expansion when the anchor is driven into a slightly smaller diameter hole. In several pull-out tests, the screws rather than the anchor broke. Maximum load pull was 2965 pounds with the use of a No. 20 screw. Plastic material is tough, yet pliable and features great impact and tensile strength—5000 pounds per square inch. It is immune to age and corrosion and unaffected by water or acids. It is reported to withstand temperatures to 78° below zero or up to 180° F.

COMPOUNDED SHEET STEEL ROLL: In the manufacture of a special compound roll for cold rolling sheet steel, the Office of Technical Services, Washington, reports a German foundry casts the roll of the desired shell analysis in the normal manner up to a point above the body. Casting is then stopped and a pause is made during which time the shell of the roll is solidifying. During this waiting time, small shots of gray iron are made to keep the down-gate and



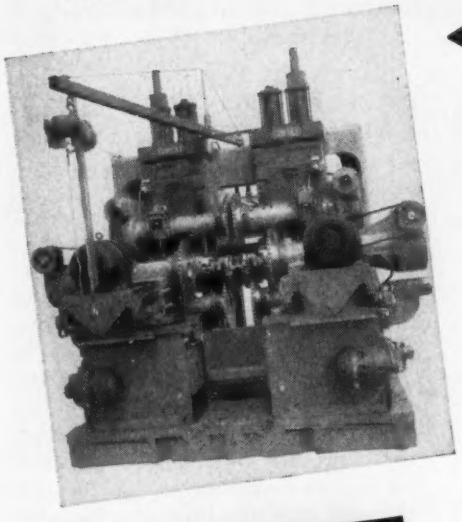
BAKER BROTHERS 40 HP BORING & DRILLING MACHINE.

Cone-Drive to the spindle "gives powerful but smooth transfer of power" to the CARBIDE tipped multiple blade cutter head.



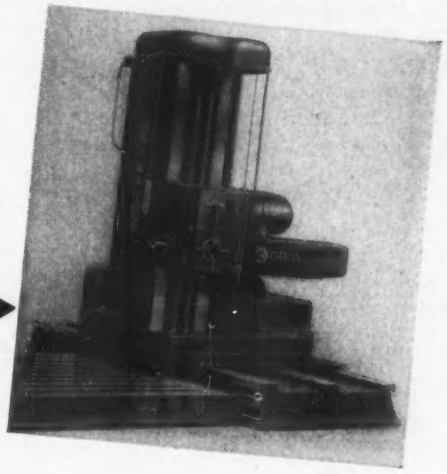
GIDDINGS & LEWIS MACHINE TOOL CO.'S BORING, DRILLING & MILLING MACHINE.

Cone-Drives are used on this as well as other G & L machines for smooth, accurate transfer of power in less space than otherwise possible.



GISHOLT MACHINE COMPANY'S 50-TON 180-HP TURN MILL.

Roughs all rod bearings on a crankshaft from the forging every 2 minutes. The six 24" OD—78 rpm cutters are individually driven from 25 hp motors through 25:1, 10" C.D. Cone-Drives at 445 SFPM. This drive not only transmits high power smoothly but saves considerable space. Two 4" and two 5" C.D. (No. 7415) Cone-Drives rotate the work spindle smoothly at 1 rpm. The 5" Cone-Drives are driven by 2 pinions, one on each side of the gear, arranged so as to eliminate backlash.

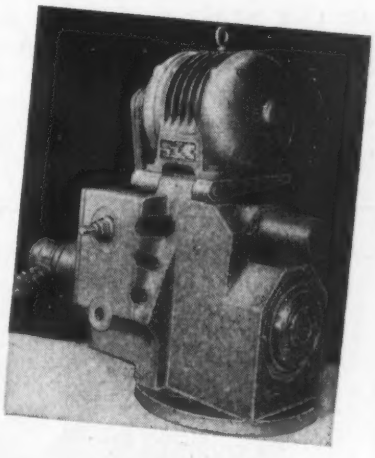


G. A. GRAY CO.'S 36 TON HORIZONTAL BORING, DRILLING & MILLING MACHINE.

7½" C.D. Cone-Drives feed the column smoothly along the runway at ½" to 120" per minute to a micro-jogging accuracy of 0.00025". Gears are self-locking for climb milling conditions, make for compactness by saving space.

MICHIGAN TOOL'S NEW "3-WAY" UNDERPASS GEAR FINISHER.

Faster gear finishing by *any* of 3 methods (selected at will) plus of course real smoothness and accuracy through Cone-Drives to the high speed cutters.



SHEFFIELD CORPORATION'S GEAR CHAMFERING MACHINES.

With Cone-Drive geared heads "for greater accuracy, less chance of backlash, more tooth-to-tooth contact and higher gear strength."

Did you See them at the Machine Tool Show

plus numerous other new Cone-Drive operated machines.

CONE-DRIVE

CONE-DRIVE DIVISION

MICHIGAN TOOL COMPANY
7171 E. McNichols Road, Detroit 12, U. S. A.

ingate fluid and prevent freezing up. On completion of the waiting time, a plug immediately under the pouring basin is opened and pouring of gray iron is commenced down the sink head. Original shell metal flows up the down-gate and out of the plug opening into a chill set ready to receive it, and marked for quantity displaced. Entire original core is replaced in this manner. As manufactured, roll consists of an outer layer of hard alloyed white iron, a remarkably sharp line of demarcation, and an inner core of soft gray iron of a completely different analysis. Overflow metal is remelted and used for subsequent rolls.

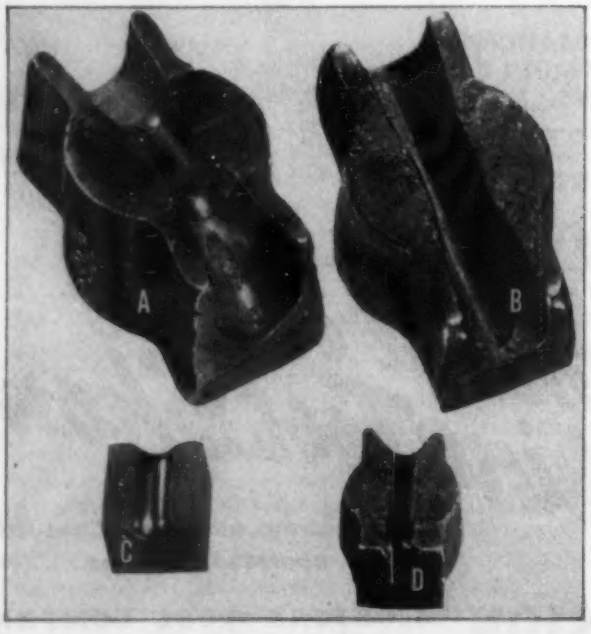
TAKES PUNISHMENT: In Akron, O., B. F. Goodrich Co., revealed that the huge cord conveyor belt it supplied a western mine some 5 years ago, recently completed hauling more than 15 million tons of copper ore. Designed to handle a maximum of 1000 tons of ore per hour, the 2320-foot belt, since its installation, averaged about 850 tons per hour. It also met severe conditions successfully at the loading end where the belt was subjected to terrific impact as tons of the ore-bearing rock, often 6 to 8 inches thick and 1 foot in length, were dumped on it from the mouth of a 45-degree discharge chute 12 feet above.

TO CUT STAIR CLIMBING: Medium size stores and banks soon may be providing customers with convenient up-and-down transportation through a new low-priced single-file electric stairway developed recently by Westinghouse Electric Corp., Jersey City, N. J. By standardization and mass production, and by limiting the maximum rise of the new stairway, the company expects to achieve design and production economies that will enable it to build the units at a price 30 per cent lower than present models of similar capacity. Manufacture of the stairway is scheduled to start the first of the year, with initial deliveries of the stairways beginning in April.

NOMENCLATURE FOR ALLOYS: Alloy Casting Institute, representing producers of corrosion and heat resisting stainless steel castings recently adopted a standard nomenclature for various alloys, it was learned from Empire Steel Castings Inc., Reading, Pa. In the system, the 18-8 alloys are represented by letters "CF" followed by a figure giving maximum carbon content allowed. For example, CF7 indicates an 18-8 alloy with a maximum carbon content of 0.07 per cent. Modifications of the alloy are indicated by letters following the figure. Besides the various alloys indicted by the maximum carbon content such as CF7, CF10, CF16 and CF20, the common alloys are those to which molybdenum, columbium, selenium, etc., are added for specific purposes. Lower carbon alloys give somewhat better corrosion resistance than the higher carbon alloy. For instance, in a 19-9 stainless steel with a carbon level of 0.24 per cent, penetration by nitric acid amounts to 0.0025-inch per month, generally considered evidence of satisfactory corrosion resistance. Reducing carbon content to 0.099 per cent effects a reduction in penetration rate to 0.001-inch per month. Where requirements call for still greater corrosion resistance than that obtained by reducing carbon to a safe minimum, particularly with acids, 1.5 to 3.5 per cent molybdenum is added to the base alloy. This is then designated as CF10M. Thus CF10C represents addition of columbium.

EFFICIENT STRIPPING AGENT: Gilsonite, rubber base and metacrylate finishes are removed from metal sheets efficiently by a chemical stripper now produced by Klem Chemicals Inc., Dearborn, Mich. In removing paints and enamels, the development leaves sheets clean for subsequent operations. Paint film is not disintegrated and no residue is left on the surface.

"RICE-GRAIN" TUBE: A radio tube smaller than the eraser of a lead pencil—only a trifle larger than a grain of rice—was developed recently by the tube laboratory of National Bureau of Standards, Washington. The "rice-grain" tube, known as the microtube, is one of the developments uncovered in a basic and applied research program on vacuum tubes, undertaken by the lab in collaboration with industry, for military and industrial uses. In contrast to prewar tubes created by industry primarily for use as amplifiers in hearing aids, the new subminiature tube is suited to a variety of other applications including such industrial units as detectors, amplifiers, rectifiers and oscillators.



OUTWEARS 150 DIES: Work of 150 ordinary dies was successfully duplicated by the cemented carbide dies designed as wire straighteners by Adams Carbide Corp., it was learned in New York. Developed at request of Capitol Steel Corp., same city, the dies were placed in operation in March, last year, and have lasted a continuous operating pace for over 300 days. In the view, A and C represent carbide dies, while B and D show those previously used. Latter lasted an average of 2 days due to the harsh abrasive action of scale on the hot rolled wire they were straightening for concrete reinforcing rod. Die A consists of a carbide insert in a casting to handle wire ¼ and ½-inch diameters. Solid cemented carbide was used in die C for straightening smaller wires

CMP COLD ROLLED *Spring Steel*

...brings plus qualities to product and production

● In their critical search for the means of achieving higher product quality and greater production efficiency, more and more users of high carbon steel are turning to CMP Carbon and Alloy Spring Steel. If yours is a problem of product, production or profit you would do well to check the advantages of this precision material.

Because of its precision characteristics and consistent results CMP Spring Steel offers important plus qualities to both your production operations and your end product.

CAN YOU AFFORD TO OVERLOOK THESE DISTINCTIVE ADVANTAGES?

- **Width and gauge are accurate to closest tolerances.**
- **Chemistry is held within proper range for best heat treatment response.**
- **Annealing is controlled for the ideal spheroidization.**
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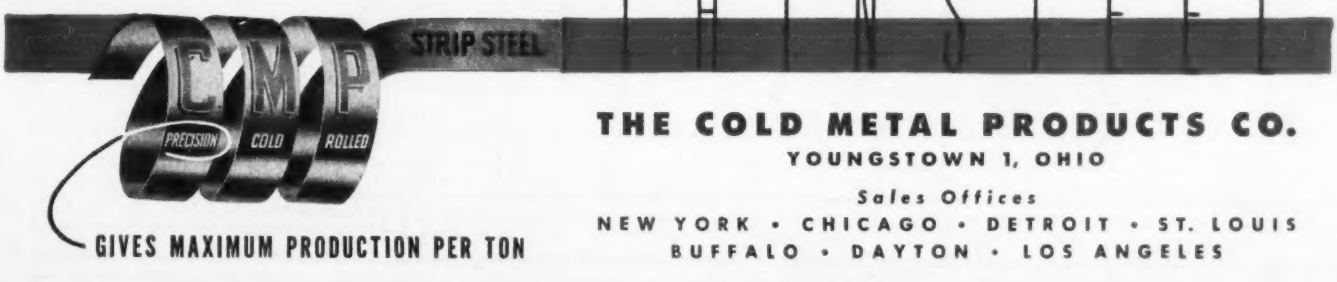
- **Physicals are uniform throughout every shipment.**

Chances are we can help in your spring steel problems. . . . Write, wire or call.



GIVES MAXIMUM PRODUCTION PER TON

THE COLD METAL PRODUCTS CO.
YOUNGSTOWN 1, OHIO

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Simplified

PRODUCTION SCHEDULING

Manufacturer of automatic machinery adopts accurate scheduling system that relieves foremen of paperwork burden and at the same time permits sandwiching, adjustments and flexibility

By GERALD ELDRIDGE STEDMAN

OUTSTANDING example of a smooth-working scheduling system is one installed at Auto-Soler Co., Atlanta. It is simple and precise, requires only part time of one technician. It makes possible accurate scheduling of men, materials, machine loading with high efficiency, reveals at any hour a visual progress report. It holds inventory in float to a minimum, in precise timing brings the next job complete to machine side on pallet, throws an automatic "behind schedule" report on a manhour basis per part or machine each day or each weekend, as desired. It seems the answer to the shop superintendent's prayer.

The company produces automatic soling, nailing and heeling machines of great appeal particularly in the shoe, woodworking and plastic fields. There are four models in the line. Basic principle involved is the magazine feed of a coil of kurled wire through a stationary and movable knife assembly in such manner as to cut and point nails of varying length which are driven, clinched and countersunk by the driving head at the rate of three per second.

Typical parts such as brackets, levers, horn rack, driver clutch, ratchet collar components are of cold rolled steel, usually SAE 1020. Most components, however, are made of tool steels, generally of the chromium-molybdenum group. Some 200 parts are involved in the scheduling of two Auto-Soler models and 225 parts in the Auto-Nailer.

Shop is equipped with batteries of Cincinnati milling machines (Nos. 2, 3, 4), Warner & Swasey turret lathes (Nos. 3 and 4), grinders. multispindle drills. Considerable use is made of magnetic chuck jigging. Straight-line flow employs the latest floor layouts, sub-subassembly bays and a 5-station final assembly line, work traveling on V-tracked dollies. The shop is an ideal production setup in miniature, having all the latest meth-

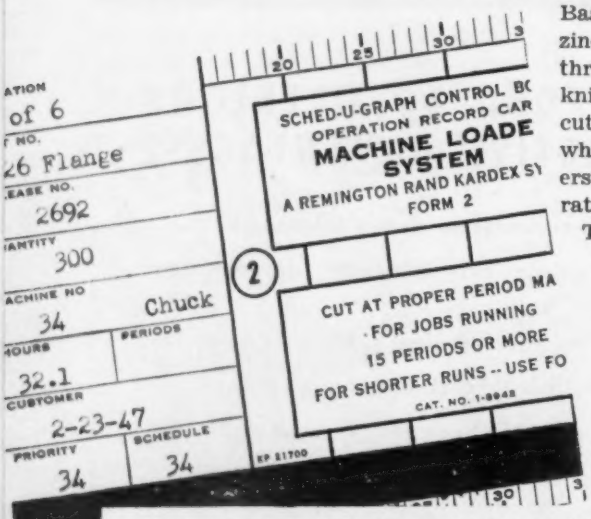


Fig. 1—Foremen refer to schedule board located at door of tool crib. Kept accurate to the minute, it eliminates paperwork in shop scheduling

Fig. 2—Remington Rand Kardex schedule slips are prepared in accordance with number of hours required on each part operation

Fig. 3—Stock record card shows number of parts on hand at any time.

Qty. to Run- 300 Time to Run- 8 Weeks Minimum- 120 Ordering Point- 500

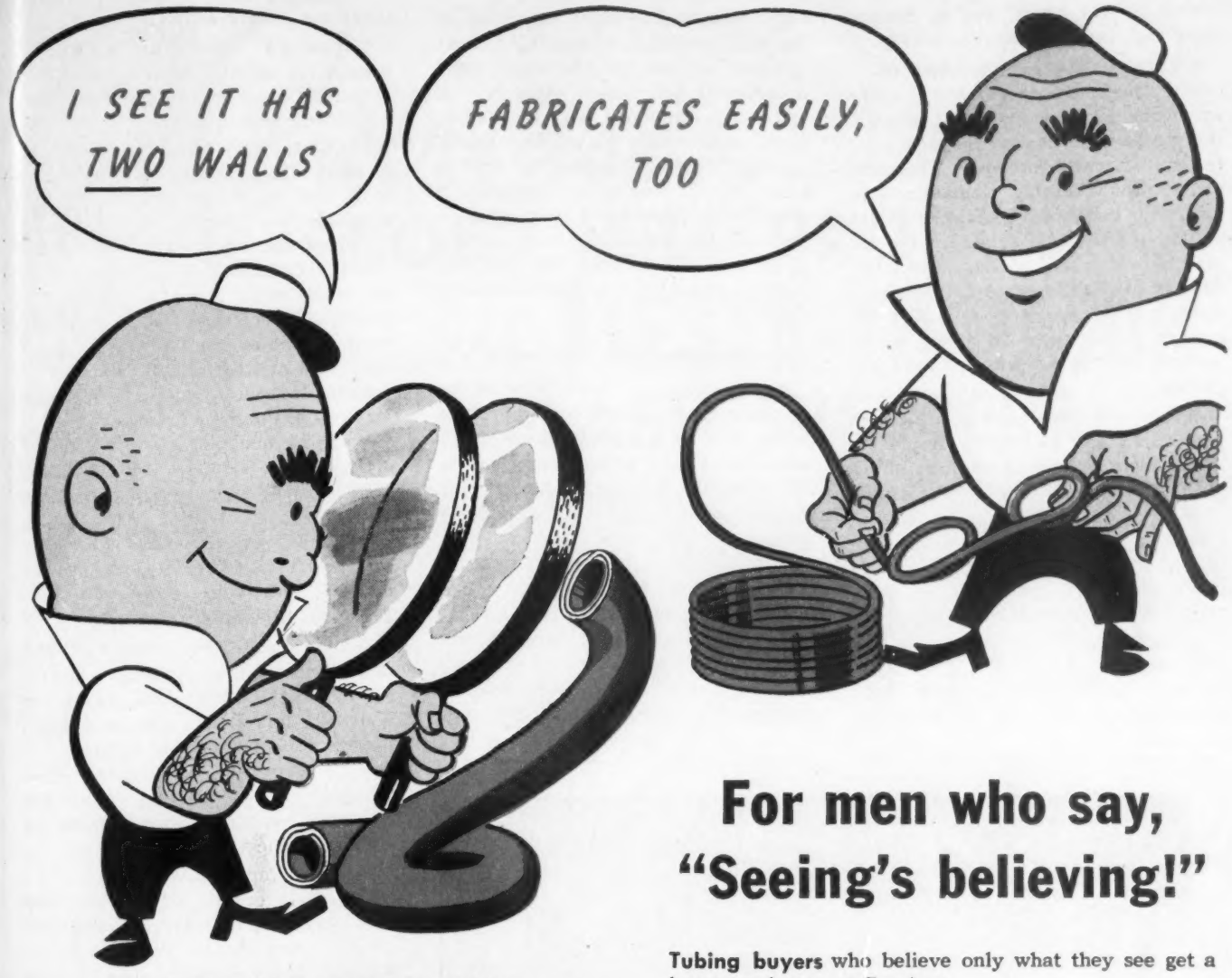
DISBURSEMENTS

Rec'd	Date	Ord. No.	Quant.	Bal. O.H.	Rec'd	Date	Ord. No.	Quant.	Bal. O.H.	Rec'd	Date	Ord. No.	Quant.	Bal. O.H.	Rec'd	Date	Ord. No.	Quant.	Bal. O.H.
297	1-21	2418		384															
	1-22	6	50	334															
	1-23	Adj.		329															
	1-28	7	50	279															

DESCRIPTION

3 MINIMUM MAXIMUM

SHORT NUMBER 526 ARTICLE FLANGE ORDERED SHIPPED LONG SECTION AISLE BIN



For men who say, "Seeing's believing!"

Tubing buyers who believe only what they see get a hearty welcome at Bundy.

When they look at Bundyweld* Tubing, we know what they are going to learn—and we know they're going to like it.

They're going to see solid, double wall tubing of great strength—yet, it fabricates with ease.

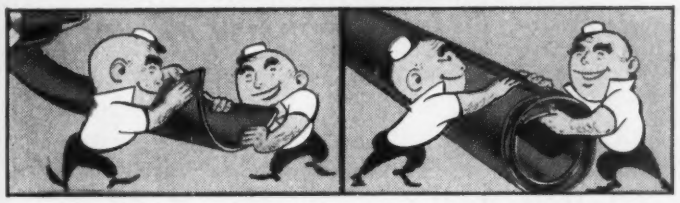
A further look will show them how Bundyweld Tubing can give greater dependability to their product at economical prices.

Look at these important advantages made possible through the patented Bundyweld process:

- **solid, double wall**
- **great resistance to vibration fatigue**
- **strength combined with ductility**
- **uniform tolerances**
- **ease of fabrication**
- **high bursting strength for pressure applications**
- **low cost**

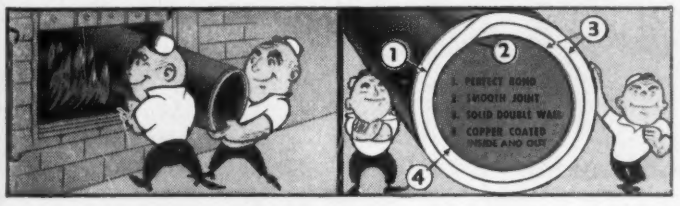
Your tubing problems will get better answers from Bundyweld. Write today. *Bundy Tubing Company, Detroit 14, Michigan.*

WHY BUNDYWELD IS BETTER TUBING



1 Bundyweld Steel Tubing is made by a process entirely different from that used in making other tubing. A single strip of copper-coated S.A.E. 1010 steel is continuously rolled twice laterally . . .

2 . . . into tubular form. Walls of uniform thickness and concentricity are assured by the use of close tolerance cold rolled strip. This double rolled strip passes through a furnace where the . . .



3 . . . copper coating fuses and alloys with the double steel walls. After brazing and cooling, it becomes a solid double wall steel tube, copper brazed throughout 360° of wall contact . . .

4 . . . copper coated inside and out, free from scale, closely held to dimensions. Hard or annealed in standard sizes up to 5/8" O.D. Special sizes cold drawn. Also in Monel and nickel.

*REG. U.S. PAT. OFF.

BUNDY TUBING

ENGINEERED TO ® YOUR EXPECTATIONS

BUNDY TUBING DISTRIBUTORS AND REPRESENTATIVES:

Pacific Metals Co., Ltd. 3100 19th St. San Francisco 10, Calif.	Standard Tube Sales Corp. 76-01 Woodhaven Blvd. Brooklyn 27, N.Y.	Lapham-Hickey Co. 3333 W. 47th Place Chicago 32, Illinois	Rutan & Co. 404 Architects Bldg. Phila. 3, Pa.	Eagle Metals Co. 3628 E. Marginal Way Seattle 4, Wash.	Alloy Metal Sales Ltd. 861 Bay St. Toronto 5, Canada

ods of largest shops, but in dimensions that can be readily observed.

Scheduling sequence involves from one to 35 operations per piece, average being 12. At the start, production parts were banked in parts centers with a parts foreman. This provided poor ordering control. The company then developed a method which used a lot-production-per-week plan in which an "A" day (assembly day) was established each week. All routing and scheduling of parts leading up to A-day were given minus number of days determinant for completion.

Work must then have been assembled and ready to ship by A plus 5. Stock room procedure was originated with an established stock record as basis for parts supply. Every part had its "A-minus" schedule. Ordering points were established on the stock record of each part to meet these "A-minus" requirements.

Plant production increased and volume reached peaks where foremen couldn't keep track of the float. There grew the urgent need to keep the right jobs in the right machines in the right sequence at the right hourly time. A year ago, the turret lathe department fell under capacity. A bad pinch developed, and a schedule sheet system per lathe was established. This was refined so that a board layout was made horizontally on lathe operations per hour. It gave some considerable direction in scheduling jobs to run next, but had limitations in that it was still necessary to guess.

Full Scheduling Necessary

For example, if there were 20 involved operations on a certain part of which Nos. 1, 2, 3 and 18 were turret lathe operations, lathe timing had to be guessed. So these experiments pointed up the need for a completely integrated scheduling method over the entire operation range. Thus, full scheduling, full sequences, established hour-points were installed on a full board visualization to permit determination when each requirement would come up. The system was installed, has been refined and now functions nearly automatically.

Company's scheduling system makes use of the Remington Rand Sched-U-Graph scheduling slips. The scheduling board, Fig. 1, is 43½-in. wide, 29 in. high and 40 in. long. It is located at the right of the locked tool crib entrance and is always available for foremen reference.

Top of the scheduling board is divided horizontally into the days of the work week and the date of the month. The vertical left column lists shop machines and machine number. The A-S board now contains 50 pockets to hold scheduling slips. Operations are assigned standard hours. Slips are graduated in standard hour divisions. A-S works a 9-hour day, 5 days each week. Slips can, however, be automatically adjusted to any work arrangement. Naturally, the board could have many more pockets, but these 50 answers present A-S scheduling requirements.

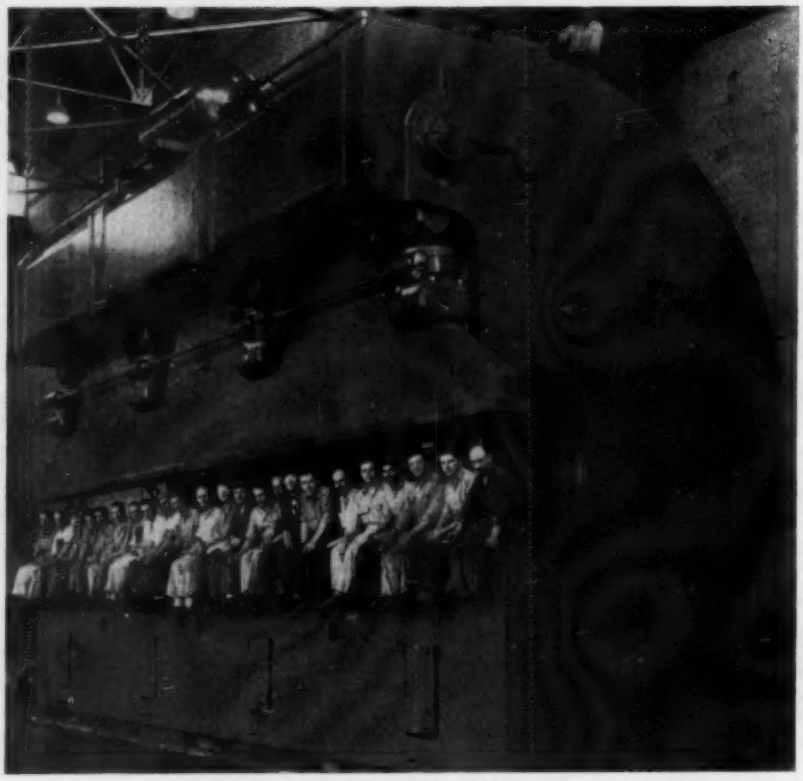
Among the distinct values of this scheduling system are: (1) Establishment of machine load, (2) manhour scheduling; i.e., jobs in process in respect to manpower, (3) progress reports, providing a manhour estimate of behind schedule hours, (4) efficiency estimates, comparisons of standard time with actual.

Physical forms involved are: (1) Production order, (2) scheduling slips, (3) bills of material (raw and finish), (4) materials requisition, (5) Kardex stock record, (6) behind schedule report.

Stock record, Fig. 3, contains an ordering point for each part. This is determined by the time required to run the part through the shop. When this point is reached, the stock record clerk issues a materials requisition. This goes at once to the planning department and a production order number is assigned, the order is written, raw material and finished parts are figured and billed.

Schedule slips, Fig. 2, are prepared and cut in accordance with the number of hours required on each part operation. Standard hours for each operation are derived from time studies. These standard hours are recorded on the schedule slips, based on the 9-hour day scale shown on the schedule slip forms. On the standard Sched-U-Graph time scale, the unit can be standardized on any hourly basis for any work, even up to 24 hours per day.

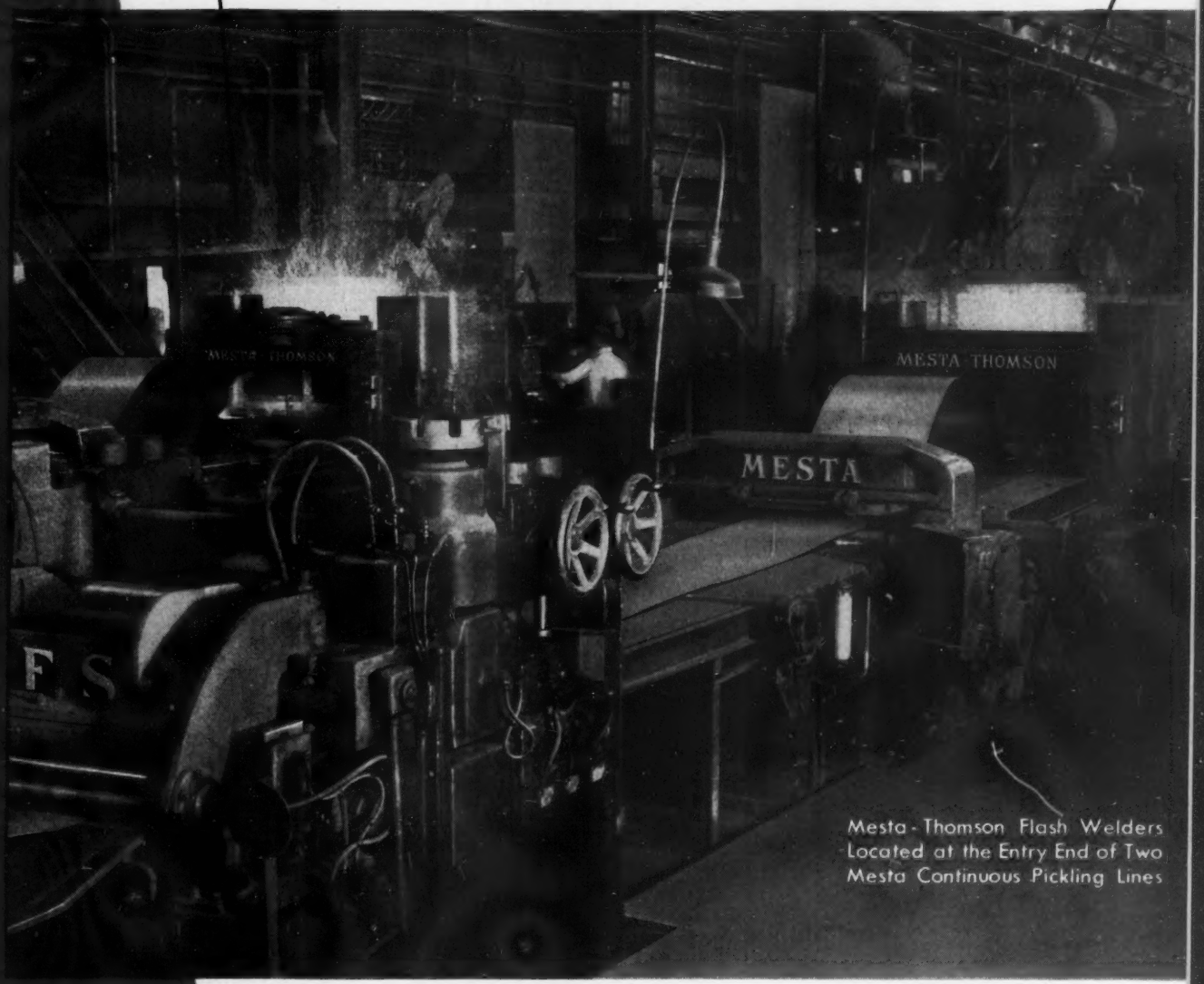
Schedule slips are placed in the board in this manner: (1) The schedule of the last operation to be completed by the required date is noted on the production order. (2) Time is allowed for the last operation to be performed, plus a cushion of one day



500,000 POUNDS OF PRESS BRAKE: Of fully stress relieved welded steel construction, this mechanical press brake, said to be the world's largest by its maker, Warren City Mfg. Co., Warren, O., is designed to exert a pressure of over 1000 tons for bending up to a right angle in a single stroke steel plate ⅝-inch thick in lengths up to 36 feet. To be delivered to the McKeesport, Pa., plant of Jones & Laughlin Steel Corp., the brake makes 15 strokes per minute. All its moving parts are counterbalanced by air cylinders and its 10,000 pound flywheel, driven by a 75 horsepower electric motor, rotates at 450 revolutions per minute. Control is from an electrical pushbutton station

Increase...

COLD MILL PRODUCTION *with* MESTA-THOMSON FLASH WELDERS



Mesta-Thomson Flash Welders Located at the Entry End of Two Mesta Continuous Pickling Lines

Cold mill production is increased when MESTA-THOMSON FLASH WELDERS are installed in your continuous pickling lines. They produce heavier coils, with butt-welded joints, suitable for cold rolling on today's high speed mills.

DESIGNERS AND BUILDERS OF COMPLETE STEEL PLANTS

MESTA MACHINE CO., PITTSBURGH, PA

ARISTOLOY

QUALITY ELECTRIC FURNACE STEELS

STANDARD STRUCTURAL ALLOY

ALLOY TOOL

BEARING QUALITY

SPECIALTY

NITRALLOY

CARBON TOOL

STAINLESS

MAGNAFLUX-AIRCRAFT QUALITY

NONE FINER

ARISTOLOY STEELS

COPPERWELD STEEL COMPANY

WARREN, OHIO

between changes to provide a factor to play with for unforeseen circumstances. (3) The procedure of (1) and (2) is repeated in reverse sequence for each operation until operation No. 1 is finally scheduled. (4) Scheduling is supported to assure material by marking the materials bill to be delivered to the shop 2 days before the start of operation No. 1. Thus, for example, power cutoff saws have been signalled two days ahead to make ready on materials.

Blueprints, tools and materials for each run are placed on pallet and brought to machine side in accordance with the schedule slip sequence as indicated from day to day, or from hour to hour. This sort of precise scheduling per part has many advantages. For example, new turret lathe equipment was installed on a floor having insufficient area. So work in the turret lathe department was rescheduled to varied machines to permit the new installation to handle most of the chuck work. This removed the space difficulty and actually reduced costs in that it saved much setup time on all machines.

In the use of the scheduling system, the foreman assigning the work refers to the schedule board and finds what job is to run next on each machine. He immediately checks material delivery. He provides the stock man with the production number the day before the scheduled run with instructions as to where and at what hour to deliver by pallet. This establishes simplified and accurate material control. This system brings the foreman to the schedule board rather than creating the paper work necessary to provide them with a schedule summary.

This is a live schedule board. It is not a canned schedule. The system permits sandwiching, adjustments and flexibility. It eases the foreman's burden for he can think in detail of setting up for the job immediately ahead. He can anticipate the needs of material, drawings and tools, and have all by machine's side on pallet at the proper moment. There is no confusion, no backtracking, no delay.

Another advantage of this schedule board is that it enables preparation of a progress report known as "behind schedule". These are weekly reports on Saturday morning when plant is down, and are made up from the Kardex stock record. All parts are listed that are past due or below minimum stock balance. The board is rescheduled to expedite finishing this list. Parts are given priority at the start of the new week's runs. This keeps minimum inventory in float and assures proper materials control and balance. It emphasizes the importance of teamwork, and in fact, encourages it.

Each week, from the schedule board and in relation to the individual schedule slips involving each part in process, the progress report also takes off the total shop hours behind schedule. The system has worked so well and standard hours have been so refined that there is little lag, but the report signals danger point on that portion of work that is behind from week to week. It affords excellent foundation for detailed progress comparisons.

On the back of the production order, when each operation is completed, the inspector (A-S has originated a "roving-inspector" plan) crosses off the completion of each operation with a different colored pencil. By this means, materials control receives quick signal for material movement.

Commodity Specifications Directory Supplemented

Supplement to the National Directory of Commodity Specifications is announced by the National Bureau of Standards, Washington. The 1945 edition of the directory along with the supplement provides a complete listing, by name, designating number, and issuing or sponsoring organization, all the standards, specifications and methods of test in general use for commodities produced in or purchased by this country.

According to the bureau, these publications include many items that are not strictly commodity specifications but which are closely related information essential to many users. Each specification, of which there are 44,000, is briefly summarized as to technical characteristics, scope and special applications.

INDUSTRIAL "FROSH": These girls, most of whom have never been inside a factory before, are learning how to insert automobile headlamps and flashlight bulbs into bases at the new industrial school at Westinghouse Lamp Division, Bloomfield, N. J. Earning regular pay scales, they are ready to match the pace of regular production the first day they go into the plant. Procedure formerly was that new employees learned assembly techniques from older operators while working with them in the factory on production

Machine Tool Show

(*Continued from Page 79*)

American Society of Tool Engineers and American Foundrymen's Association jointly sponsored the third session of the Machine Tool Congress, Sept. 19 at Hotel Sherman. F. J. Schmitt, director of sales, D. A. Stuart Oil Co. Ltd., Chicago, and chairman, Chicago chapter of the Tool Engineers, presided, and was assisted by S. C. Massari, technical director of the Foundrymen's Association.

The meeting featured two speakers. Myron S. Curtis, assistant director of engineering, Warner & Swasey Co., Cleveland, presented a paper entitled "Turning Points in the Metalworking Industry," and T. E. Eagan, chief metallurgist, Cooper-Bessemer Corp., Grove City, Pa., and past chairman, Gray Iron Division, American Foundrymen's Association, discussed "When and How To Use Cast Iron."

Wealth Dissipated By War

Mr. Curtis prefaced his discussion with the statement that we are living in a world where most of the wealth —the latter considered in its only true sense, that of things created—has been dissipated by years of total and destructive war. There is only one way to increase wealth, and that is by producing it, by production.

Only two ways exist to increase production. They are either to increase the productivity of the individual by having him work harder and produce more per hour as a result of his direct labor, as to provide him with tools of increased productivity, so that, with the same amount of work, he will produce more goods.

Perhaps even if we could, we would not want to increase production by manual labor. The American way, Mr. Curtis emphasized, always has been to create more wealth, and provide a better standard of living for its workers, by more, better, and more efficient tools than other nations.

The productive capacity of any machine tool is controlled by two major factors. These are machining time, that is, the time actually spent in removal or forming of metal; and handling time, namely, the time required to load and unload the workpiece, to change speeds, bring tools into position, etc. To increase productive capacity of a machine tool effectively, both factors must be given attention. If machining time alone is continually decreased, the handling time soon would be so far out of proportion that any further decrease in machining time would result in only a slight improvement in productive capacity.

Anything to do with speed seems to have an overpowering attraction to Americans, thus the spectacular part of machine tool operation always lies in seeing metal removed at a rapid rate. However, there is a limit to the practical speed at which metal can be cut, and beyond that point it is much more important to pay attention to the decrease in handling time than it is to the increase in cutting speed.

Research On Carbides

Research conducted by Warner & Swasey Co. on extent and limitations of practical carbide applications has yielded much valuable information about interrelationship between cutting speed, feed per revolution, depth of cut, rate of metal removed in cubic inches per minute and cutter life. Main conclusion is that in interest of longer cutter life, whenever there is a choice of the combination of speeds, feeds and depth of cut which can be used for the given rate of metal removal, the first choice should be in favor of the heavy depth of cut, the second choice should be for heavy feeds and the third choice should be for high speed.

Perhaps in the majority of cases, the depth of cut is predetermined by amount of stock to be removed, in which case there still lies the choice between high speed and light feed.

In the opinion of the speaker, we have reached the place where machining time cannot be reduced further than is already possible with up-to-date tooling methods and full utilization of the productive capacity of the turret lathe. On the other hand, it has been realized for some time that the greatest gain toward greater productivity is to be made by focusing attention on this other factor, namely, handling time.

Along with cutting and handling time, the production time on metal parts depends upon the degree of finish given to them and we are not too accurate in our thinking on this score. The tendency of the metalworking industry, and particularly the machine tool industry, is to produce better finishes than are necessary. Every surface produced by a machining operation is intended to perform a function, including the function of appearance. This latter is perhaps the hardest standard to set up. True thinking will rightly define quality as meaning functionally suitable, accurate and long-lived.

In the opinion of Mr. Curtis, the biggest advance in production effiency is in the attention which has been paid to reduction of handling time. As an example, the application of electric control to ram-type turret lathes, whereby various handling operations such as spindle speed change, etc., previously done manually, are now done automatically, increases production efficiency of the machine from 30 per cent up. This is against an increase in production efficiency of from 3 to 10 per cent by having the exact cutting speed.

Gray cast iron is an interesting engineering material, asserted Mr. Eagan in introducing his paper, but a material on which it is impossible to talk intelligently without considering the metallurgical aspect. Gray iron can be very broadly called steel plus graphite, the latter occupying 11 to 17 per cent of the volume depending on analysis and cooling rate of the casting and controlling to a large extent its physial characteristics. By controlling distribution size and amount of graphite flakes, tensile strengths between 10,000 and 60,000 psi can be produced. Ability to do this is the foundryman's problem.

Whether gray iron is the proper material to use depends upon the job it is expected to perform, and this in turn depends upon its physical properties and the knowledge of the design engineer of these properties, Mr. Eagan stated.

Use of Gray Iron

Because tensile strength of gray iron indicates to a certain extent the other properties desired, the general rule has been to specify it as the controlling factor for the purchase of castings. Why have seven different classes of gray iron, the speaker asked. In the first place, the lower the class of iron designated, the cheaper it is. Thus the problem of economics enters into it. Secondly, the higher classes of iron are very difficult to cast into thin sections. Section thickness has a great deal to do with the tensile properties obtained in any casting.

The fundamental thing that controls tensile strength in any gray iron casting is the rate at which it cools from molten metal down to approximately 1000° F. For any given analysis, the tensile strength obtained in the casting is proportional to its cooling rate. Unfortunately, the speaker stated, not much can be done about the cooling rate of any given casting because this is controlled primarily by design of the casting, size of flask, method of gating and sand used. These are pretty well fixed by the foundry practice required to produce sound castings. Therefore, to obtain any required tensile strength, it is necessary to control chemical analysis.

Yield point of gray iron is close to

Arbor Press of Welded Design Is Stronger, Lighter, More Economical

By K. A. Ruger, President
Ruger Equipment Co., Inc., Cleveland 14, Ohio

FOLLOWING the modern trend in machine design, the new Ruger 10-ton portable hydraulic arbor press was designed for arc welded steel construction for two reasons: (1) because we have found arc welding is generally the most economical fabricating process; (2) to achieve the greatest strength from the least weight. The Ruger press can easily be moved from place to place by one man as the total weight is only about 100 lbs.

Fig. 1 shows the component parts. The plates are SAE 1020 mild steel, cut out on a flame-cutting machine guided by templates. The two side plates are braked to a 1⅛″ offset so they are closer together at the top. The base angles are formed from ⅜″ flat plate on a brake and the corners rounded on the flame-cutter. The cylinder cover is seamless steel tubing bored out to take the hydraulic cylinder.

The sides, angles, spacer plate and cylinder cover are assembled in a jig and tack-welded together. Nearly all welding is done in this jig, which is tilted to various positions for 100% downhand welding. Fig. 2 shows the cylinder cover being welded to the side plates.

Maximum welding speed is obtained by using Lincoln "Fleetwelding" technique—single pass, deep penetration welds in downhand position. "Fleetweld 11" electrode is used because of its speed, penetration and smooth concave bead which requires little finishing.

The side plates are welded to the base angles with the jig at a 45° angle (Fig. 3) to make single-pass fillets. The spacer plate is welded to sides with 1″ intermittent welds and the ends of the base angles are butt-welded to the sides. The press is

Fig. 2. Welding cylinder cover to the side plates.

then removed from the jig, turned upside down and the angles joined to bottoms of the side plates with deep groove butt welds.

The cylinder welds are then ground down flush with the sides, and the other welds cleaned with a grinder. The hydraulic pump assembly is installed and a 16-gauge sheet metal cylinder cap is welded on with "Fleetweld 7," which makes a convex bead for a neat, rounded appearance. Then the unit is painted and crated.

Fig. 4 shows the completed press. Its overall dimensions are: 23½″ high, 11¼″ wide and 20″ long from front to back. The throat height is 11″ and ram stroke is 6⅝″. Ram automatically retracts to top position by a built-in counter balance.

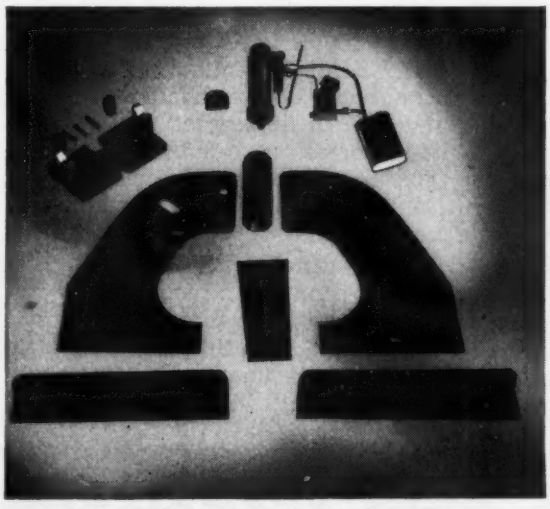


Fig. 1. Component parts of the Ruger Press.

Fig. 3. Welding base angles to side plates.

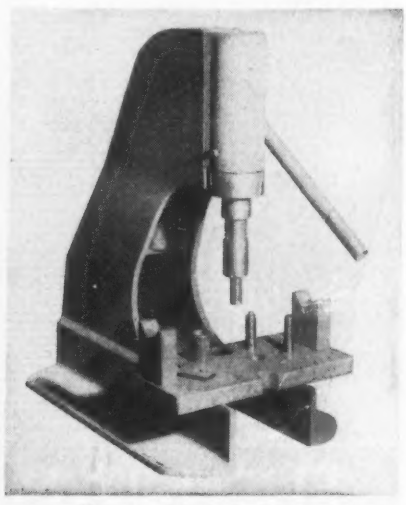


Fig. 4. The completed press.

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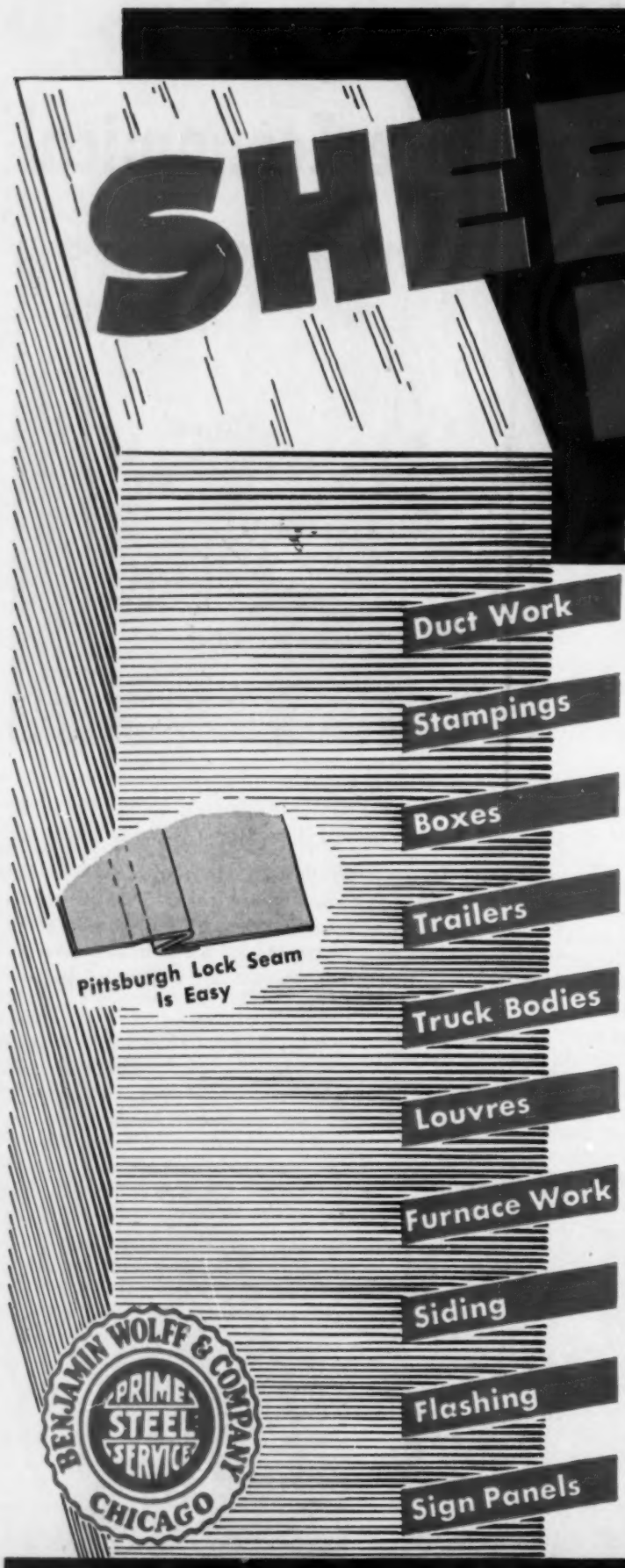

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the tensile strength and is comparable to that of cast steel, thus it is possible to use the material at higher stresses. One outstanding characteristic of gray iron is its compression strength, in fact, in compression gray iron is stronger than steel. Modulus of elasticity runs somewhere between 12 and 22 million per square inch, depending upon tensile strength, amount and distribution of the graphite, and microstructure of the matrix. However, these figures must be used with discretion, because cast iron is a heterogeneous material and does not fulfill the requirements of homogeneity, isotropy and elasticity as required by the elastic theory.

Dampening Capacity Excellent

In gray iron the theoretical endurance limit is between 35 and 50 per cent of the tensile strength, the former applying to very large sections whereas the latter would apply to smaller sections. For most sections, an arbitrary figure of 40 per cent can be used safely. Gray iron is much less notch sensitive than steel and it has excellent damping capacity. Mr. Eagan explained that it is difficult to apply dampening capacity to design but it is always well to know that it is present in gray iron, however, the higher the tensile strength the less dampening capacity it has.

Gray iron is much more brittle than steel, and when it breaks it breaks with a brittle fracture, while steel being ductile breaks with a ductile fracture. Gray iron is the most castable of all the ferrous metals, will flow into thinner sections and usually requires small or no risers, therefore, lends itself to more complicated designs than do many other cast metals.

Properly handled, gray iron is a very machineable material, with the lower tensile irons more machinable than the higher. In sliding friction, wear resistance is outstanding; it also has good abrasive wear resistance. Gray iron also has excellent corrosion resistance and good heat resisting qualities. The material can be heat treated the same as steel and hardened by quenching and drawing.

Since chemical analysis controls to a large extent the physical properties of the casting, it would seem logical that the one thing that should be specified is the chemical analysis. However, Mr. Eagan warned that this is far from the truth, in fact, it is dangerous to do so. The method by which the casting is poured will influence the cooling rate tremendously and in many cases there are a number of ways to do this, all of which will achieve the same result. The only man who is in a position to specify the proper analysis for a given casting in which the desired physical properties are specified is the foundry metallurgist who must decide this after he sees the method of molding, gating, etc. Foundrymen are willing to work to a tensile strength specification, but many will refuse to work to tensile strength and also chemical analysis.

Highlight of the National Electrical Manufacturers Association session at the Palmer House, Monday evening, Sept. 22, was Charles F. Kettering's address on mass production and the tool industry. Retired last June as vice president in charge of General Motors Research Laboratories, Mr. Kettering is now research consultant for General Motors Corp., Detroit.

Opening remarks of the meeting were made by K. H. Hobbie, president of the Machine Tool Congress and vice president, Driver Harris Co., Chicago. Speakers were introduced by R. Stafford Edwards, president of NEMA and president, Edwards & Co., Norwalk, Conn.

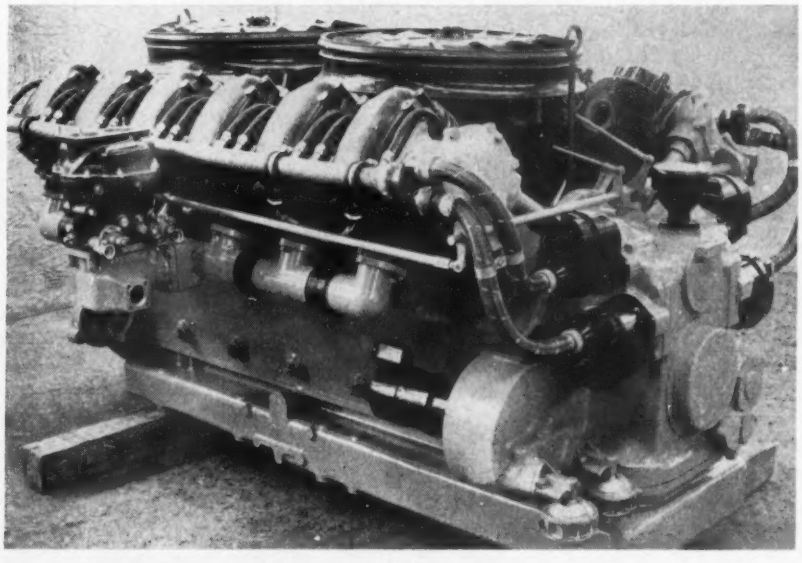
Invention of movable type, Mr. Kettering stated, was perhaps the greatest thing that ever happened in the development of education and civilization, because with movable type all sorts of things can be set up and duplicated. Machine tools are the printing presses on which ideas are published in metal, they make possible exact duplication over and over again. They are, he said, the armament for winning America's battle for abundance.

Regarding material shortages, Mr. Kettering said:

"To me one of the most amazing things is the accusation that the steel industry and the automotive industry are trying to hold back production. We are making 90 million tons of billets a year, which rolls out to something like 81 million tons of steel. The thing that we are short in the automobile industry is body sheets. We had 6 million tons of body sheets and we need about 9 million tons, because we are trying to increase the automobile business by about 50 per cent.

"We need to increase steel production, and the boys are doing it. After awhile we will have enough steel to make up for that 50 per cent increase. It takes about a ton and a half of steel for an automobile, so if you get 6 million tons you are going to have 4 million automobiles, and if you have 9 million tons you are going to have 6 million automobiles. It's just that elementary. All the investigations in the world won't create 1 ton of rolled steel."

Fifth session of the Machine Tool



HAS INTERCHANGEABLE CYLINDERS: This 800 hp tank engine of 12 cylinders mounted in V-fashion (shown here partly disassembled) utilizes interchangeable cylinders and components such as pistons, pins, valves, rods, etc., of a type designed by U. S. Army Ordnance Department and made by Continental Motors Corp., Detroit. Cylinders and other parts may be incorporated in any of several types of engines with a given number of cylinders and with the proper crankshaft. Range of horsepower is from 15 to 1400 and cylinder grouping may be in-line, "V" or horizontally opposed. Engine is completely air cooled, its 5¾ x 5¾-in. cylinders being cooled by two fans seen between banks of cylinders. Official photograph, U. S. Army Ordnance Department

Congress, held at the Electric Association on Sept. 23, was sponsored by the Chicago Technical Societies Council. Dr. Gustav Egloff, director of research, Universal Oil Products Co., Chicago, and president of the council, presided. A message of welcome was extended by Kenneth H. Hobbie, vice president, Driver-Harris Co., Chicago, and president of the Machine Tool Congress, and past president of the council.

The meeting was addressed by George Habicht Jr., president, Marshall & Huschart Machinery Co., Chicago, and president, American Machine Tool Distributors' Association, his subject being "Machine Tools and the Philosophy of Production."

Mr. Habicht told his audience that the machine tool industry represents a most important part of the American economy—our way of life—its growth, its defense and the general well being it affords its people. The industry is a part of the American way of production, namely, production by the masses for the masses. In fact, the only purpose of the industry is to assist, by inventive technique and specialized engineering, the American manufacturer to increase production and lower costs.

Tools Aid Production

After years of the most devastating war, the peoples of all nations are more keenly aware now than ever before that it takes production and more production to bring about conditions of liveable surroundings and the necessities of life, and it takes machine tools to implement this production. The speaker reminded that while the peoples of the world are agreed that we need production and more production, there is at present few places where men are free to produce, and where they have a proper incentive to produce.

The belief that production is the key to the more abundant life is largely the result of what free Americans have already accomplished in their mastery of mass production. This is one of America's outstanding gifts to the economic world. The focal point of 150 years of progress has been in the evolution and development of machine tools; and the resultant force of these machine tools has been a mass production giving forth the most plentiful supply of luxuries and everyday necessities ever enjoyed by any people at any time.

Total wealth can be increased only by constantly producing more, so that there are actually physically speaking, more things available for more people. That is why Mr. Habicht chooses to call our philosophy a "philosophy of production."

The war has widened the gap between the American and European worker and it did something else, it emphasized to the world that the American system of high output and low costs, of steadily increasing output per manhour, increases the supply of goods and raised the standard of living. The American worker can buy more for his hour's work, because he produces more.

Carbide Milling Discussed

Under sponsorship of the production and engineering division and special research committee on metal-cutting data of the American Society of Mechanical Engineers, a round-up on carbide milling developments was held Wednesday evening, Sept. 24.

In a paper entitled "Practice and Theory in Carbide Milling", Michael Field, research engineer, Cincinnati Milling Machine Co., Cincinnati, said in part:

"Experience has shown that a planned carbide milling program under the supervision of one or more specialists is a necessary requirement for the successful introduction and application of carbide milling in a shop. Complete and accurate records of the milling and grinding conditions are desirable to build up experience and to control the carbide milling practice.

"When factors which affect the cost of milling with carbides are properly considered, they indicate somewhat lower cutting speeds for the milling of steel than have been previously recommended. The conversion from high speed steel to carbide milling should be determined chiefly by economic considerations, and the role of cost analysis in the choice of cutters, their speeds and feed rates is therefore emphasized. Examples are shown of some of the 300 typical jobs which have been profitably converted at the author's company.

"The factors which affect tool life in carbide milling include cutting speed, feed per tooth, cutter angles and relative position of cutter to work. For the milling of cast iron, the microstructure is shown to provide a reliable criterion for the prediction of relative tool life. For the milling of both steel and cast iron recent trends in cutter design are described, which improve tool life and permit use of increased feed rates."

Under the title "Recent Developments in Carbide Milling", J. R. Longwell and Fred W. Lucht, Carboloy Co., Detroit, jointly presented an illustrated review of deep hole drilling, use of solid carbide boring bars, and the milling method of crankshaft machining in special "turn-milling" machines equipped with carbide tools. Emphasis was placed on time saving through elimination of traditional intermediate operations.

Society of Automotive Engineers sponsored the Thursday evening September 25 meeting at Hotel Knickerbocker. Toastmaster for the occasion was Stephen Johnson Jr., SAE vice president for production activity and assistant sales manager, Bendix Westinghouse Automotive Air Brake Co., Elyria, O. Coffee speaker was C. E. Frudden, SAE president and consulting engineer, Allis-Chalmers Mfg. Co., Milwaukee.

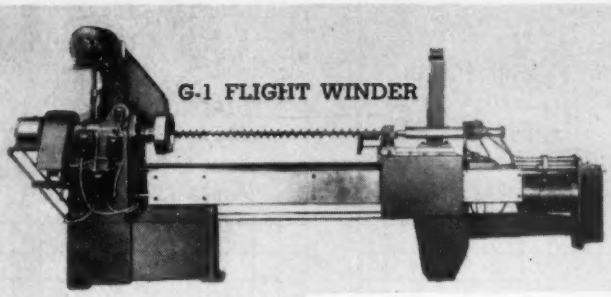
In the principal address, "A Trip Through the Machine Tool Show", Joseph Geschelin, Detroit editor, Automotive Industries, Detroit, said that the Machine Tool Show is easily the greatest spectacle of its kind held in this country. Mr. Geschelin then appraised an engineering viewpoint emphasized what it means to management, and indicated the long range trends that are evident upon examination.

Years Required for Development

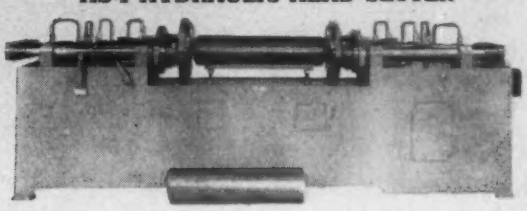
As in the development of a new motor car model where some elements may be on the boards and tested for periods ranging from 18 months to 5 years, the new machine tools usually required many years of development and trial before their introduction. Some of the machines stem from designs on the boards before Pearl Harbor, others were visualized many years before being translated into a commercial product. In all cases they represent the sum total of previous knowledge coupled with unique requirements of our present day economy.

Judging by the character of machinery exhibited in Chicago, Mr. Geschelin stated that machine tool inventors and designers are forced to look ahead, to anticipate long range trends. That is the evidence of the new crop of machine tools.

They have anticipated the rise in direct labor costs, the shifts in labor supply, the increase in cost of raw materials. They are designed specifically. to meet the challenge of today by offering features capable of still greater cost reduction — through automaticity, increased productivity simplicity of operation. Thus they not only reduce the effort of the operator, they reduce the number of machine tenders and thereby increase productivity of the higher paid worker.



G-1 FLIGHT WINDER



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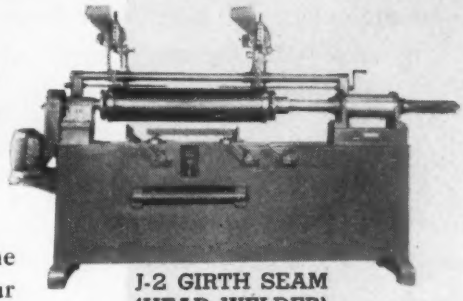
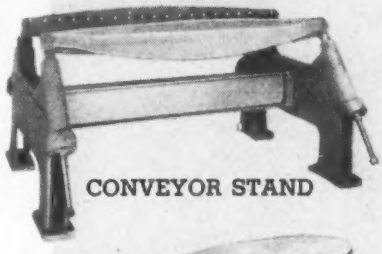


J-2 GIRTH SEAM (HEAD WELDER)



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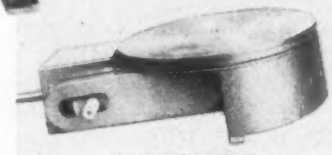

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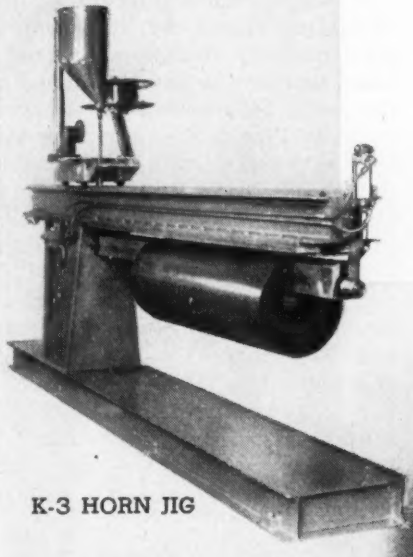

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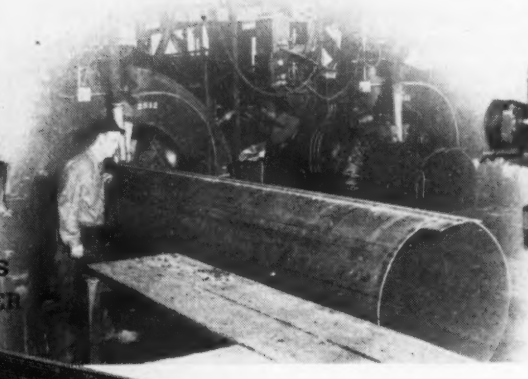

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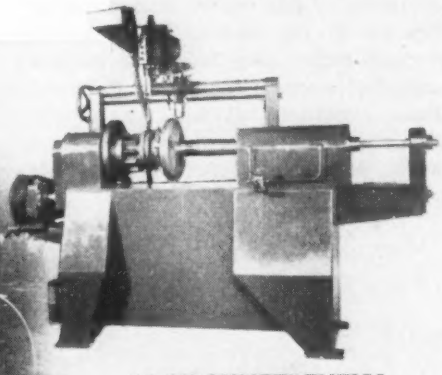

J-1 CIRCUMFERENTIAL SEAM WELDER

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Fundamental factors in steelmaking which influence impact strength and age-hardening characteristics of bessemer, open-hearth and certain electric steels used in tube manufacture are presented. Proper aging of steel depends upon technical and economical factors

Physical Properties of Steel for Tubular Products

By A. B. WILDER
Chief Metallurgist
National Tube Co.
Pittsburgh

OPEN steel commonly used in the manufacture of welded pipe may be made by the rimmed or capped steel process. Rimmed steels are finished with a low-carbon content and not completely deoxidized so that a strong evolution of gas occurs during solidification in the molds. They have a ductile outer rim lower in carbon and phosphorus compared to the core. Bath conditions at tap for capped steels are similar to those for rimmed heats. However, sufficient deoxidizer is added to the ladle or ingot mold in capped steels so that only moderate rimming action occurs in the mold. Further, a steel cap is placed on top of the mold, and as the metal rises against the cap, it is chilled and solidifies. Capping, therefore, limits the period of gas evolution and produces a steel ingot with less rim and segregation. The ingot structure in both rimmed and capped steels consists of many deep seated blow holes and a small pipe cavity. The gas entrapped during solidification is in excess of that needed to counteract normal shrinkage.

Heats are sometimes finished so that the evolution of gas in the mold is closely controlled to an amount that slightly more than offsets the shrinkage caused by solidification. Steel made by this process is semikilled and may be used in the manufacture of both welded and seamless products. Pipe cavities are minimized and the degree of uniformity is intermediate between a killed and rimmed steel. During rolling of rimmed, capped or semikilled ingots, the blowholes are welded.

Ingots with a dense homogeneous structure free from porosity or blowholes are produced from killed steel. In making killed steels, an excess of a strong deoxidizer such as ferrosilicon and/or aluminum is added to the molten steel at the end of the heat to reduce the oxygen content to

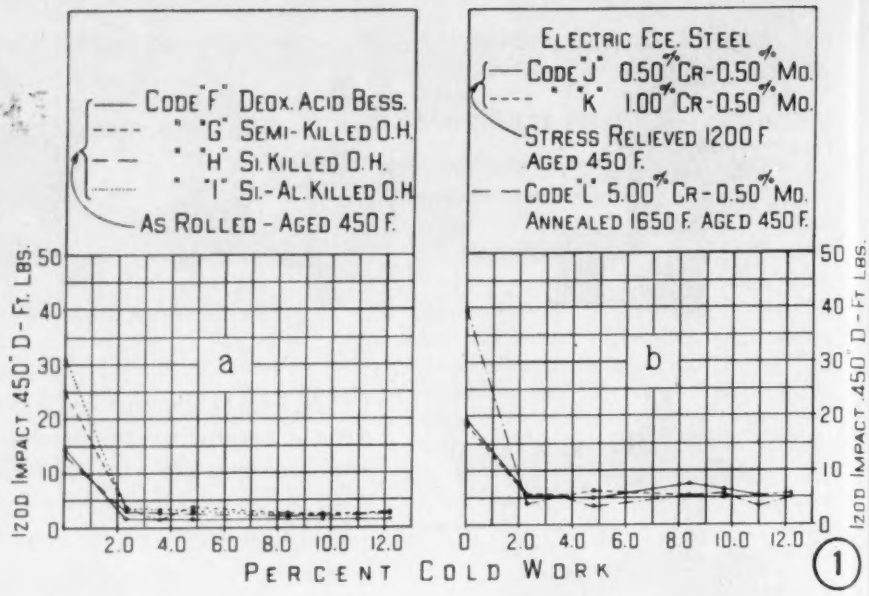
Code "F" Deox. Acid Bess.
" "G" Semi-Killed O.H.
" "H" Si. Killed O.H.
" "I" Si.-Al. Killed O.H.
As Rolled - Aged 450 F.
Electric Fce. Steel
Code "J" 0.50% Cr-0.50% Mo.
" "K" 1.00% Cr-0.50% Mo.
Stress Relieved 1200 F
Aged 450 F.
Code "L" 5.00% Cr-0.50% Mo.
Annealed 1650 F. Aged 450 F.
Izod Impact .450" D - Ft. Lbs.
a
b
Percent Cold Work
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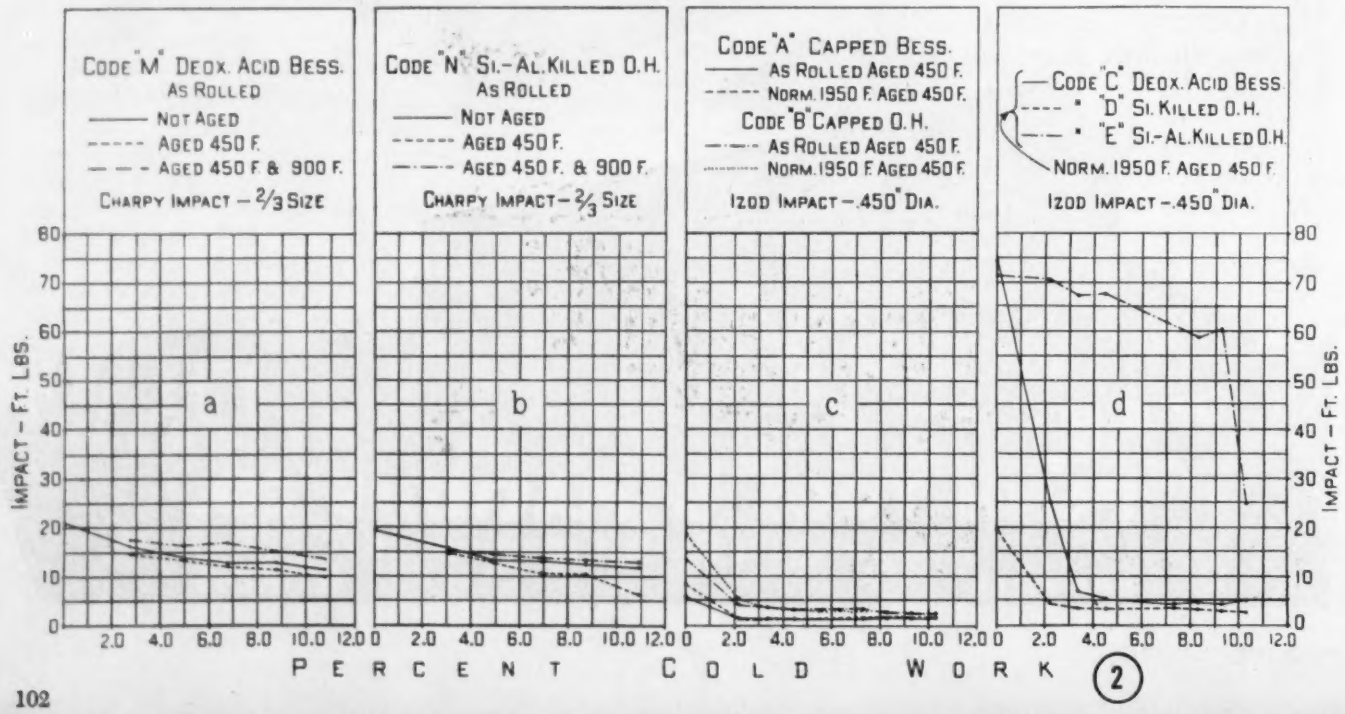
Fig. 1—Embrittlement of deoxidized acid bessemer, open-hearth and electric steels

Fig. 2—Embrittlement of bessemer and open-hearth steels



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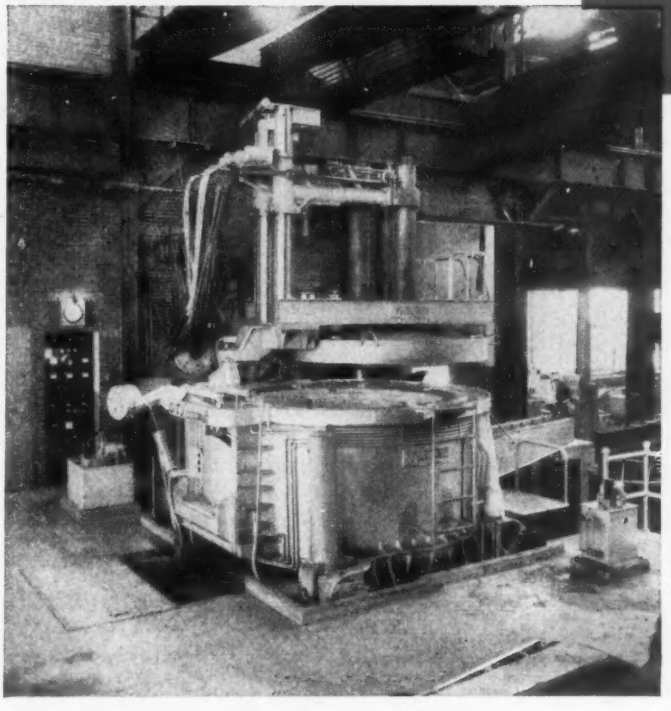

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a minimum. In steels of this type, no reaction between carbon and oxygen takes place during solidification. Careful control of the furnace charge, working the heat, and slag practice are necessary. This type of steel is commonly used for seamless pipe and has more uniform composition than any other type.

Deoxidized or killed acid bessemer steel* used in this investigation is not only deoxidized in the ladle with silicon and aluminum, but also with carbon which is added to the converter at the end of the blow as molten pig iron. In this special practice, a considerable portion of oxygen is removed as carbon monoxide gas by the addition of molten pig iron, producing a clean steel. Deoxidized acid bessemer steel used for the manufacture of seamless pipe is always killed and therefore, should, be distinguished from ordinary bessemer steel, which is capped or rimmed. Too frequently, this distinction is not made with the result that considerable confusion has existed in distinguishing between the two types of steel.

Due to the fact that deoxidation practices influence the susceptibility of steel to embrittlement, a considerable variation in this characteristic of steel is obtained which is dependent on conditions at the time of deoxidation. Also, conditions during the melting and refining periods influence the results. A further complication arises in processing which may not be related to steelmaking practices but influences the embrittlement characteristics of steel. A comparison of steel in the as-rolled and normalized conditions illustrates this point.

Embrittlement characteristics discussed in this paper which are associated with cold work are not related to specification requirements for steel pipe. Interest of the steelmaker in embrittlement and aging characteristics of ordinary steels is to develop a better understanding of these phenomena. Production of steel for low temperature services with a maximum Charpy impact value requires special deoxidation practices in conjunction with special heat treatment and frequently necessitates the use of alloy additions. Steels for this purpose are made to fine grain practice which is in contradiction to the requirements for high temperature service.

* "Manufacture and properties of Killed Bessemer Steels" by E. C. Wright, *AIME Transactions*, 1944, vol. 158, p. 107.

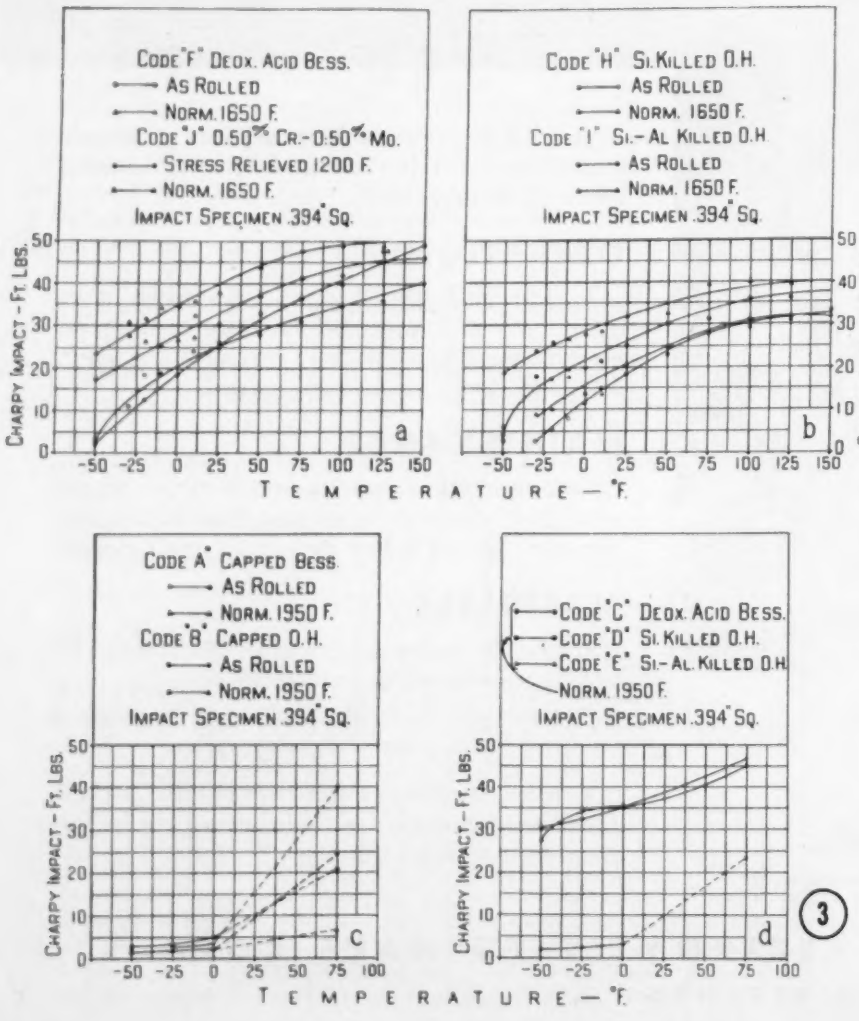

Fig. 3—Impact properties of bessemer, open-hearth and electric steels

Steels for high temperature service involving maximum resistance to creep should be made to coarse grain practice which limits the amount of aluminum added or, if necessary, alloy additions may be made to improve the creep properties. In addition to the creep properties of high temperature steels, it is also necessary to consider the resistance of these steels to graphitization. Graphitization may be controlled by using a minimum amount of aluminum and certain alloy additions in the melting practice.

Melting steels for low temperature or high temperature service involves consideration of deoxidation practice, heat treatment and the use of suitable alloying elements. Nickel, for example, improves the low temperature impact properties of ferritic steels, molybdenum the resistance to creep, and chromium the resistance to graphitization and/or oxidation. Production of ordinary steels with minimum embrittlement or aging characteristics after cold work and aging is a phase of steelmaking which is not completely understood. The steelmaker is in position to produce special steels suitable for low temperature and high temperature service, but is not in position to produce ordinary steels for these purposes due to economic factors involved. The consumer of tubular products has not developed a real need for nonaging steels and, therefore, embrittlement characteristics associated with cold deformation and aging are of secondary importance. Production of nonaging strip steels for deep drawing stock has received considerable recognition, but this situation is not related to tubular products.

Our future position in regard to the embrittlement or aging of steel depends largely upon the amount of effort put forth in developing a better understanding of the problem involved. Technical and economical factors will largely control the situation.

The nitrogen content of chromium-bearing electric furnace steels frequently exceeds that of open-hearth and acid bessemer carbon steels. This important characteristic of electric furnace steels should be recognized.

Hot fabrication of pipe frequently involves temperatures exceeding the thermal critical range and therefore grain coarsening may take place in certain types of steel. A large grain size is desirable for creep resistance at certain elevated temperatures, but

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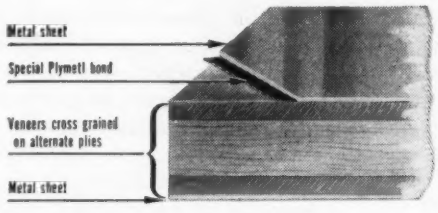

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CHEMICAL AND PHYSICAL PROPERTIES OF STEELS

Grade	Treatment	Check Analysis C	Mn	P	S	Si	Cr	Mo	Yield 1000 psi	Ultimate 1000 psi	Elong. %—2"	Austenitic Grain Size
Capped Bess.	As-rolled					.005	....	....	34.6	58.4	34.0	2-4
Capped Bess.	norm. 1950° F.	.08	.38	.079	.037				35.9	57.8	36.0	
Capped O.H.	As-rolled					.005	....	....	25.3	46.9	40.8	0-3
Capped O.H.	norm. 1950° F.	.07	.45	.006	.020				24.4	46.6	42.5	
Deox. Acid Bess.	As-rolled					.18	....	....	39.4	68.2	32.0	7-8
Deox. Acid Bess.	norm. 1950° F.	.14	.54	.074	.022				42.3	64.5	34.0	
Si-killed O.H.	As-rolled					.22	....	...	35.2	70.3	32.0	1-3
Si-killed O.H.	norm. 1950° F.	.27	.52	.016	.025				...	69.8	31.0	
Si-Al Killed O.H.	As-rolled					.23	....	...	39.2	75.1	31.0	6-7
Si-Al Killed O.H.	norm. 1950° F.	.24	.86	.013	.021				44.9	72.5	32.3	
Deox. Acid Bess.	As-rolled					.14/.15	....	....	48.4	73.6	40.7	6-8
Deox. Acid Bess.	norm. 1650° F.	.13/.15	.43/.45	.074/.080	.029/.036				47.5	69.6	46.9	
Semi-killed O.H.	As-Rolled					.10	....	....	39.3	72.5	39.8	1-2
Semi-killed O.H.	norm. 1650° F.	.28	.56	.011	.024				43.1	71.6	41.0	
Si-killed O.H.	As-Rolled					.20/.24	....	....	45.5	76.1	38.8	2-3
Si-killed O.H.	norm. 1650° F.	.25/.27	.54/.57	.015/.017	.019/.022				42.5	75.0	39.8	
Si-Al Killed O.H.	As-Rolled					.14/.17	....	....	43.9	71.3	39.9	5-7
Si-Al Killed O.H.	norm. 1650° F.	.25/.27	.47/.51	.014/.017	.023/.026				45.6	68.7	43.1	
½ Cr—½ Mo.	Stress-rel. 1200° F.	.13	.39	.011	.022	.24	.46	.50	54.1	72.7	37.5	1-3
1 Cr—½ Mo.	Stress-rel. 1200° F.	.13	.47	.016	.019	.17	.98	.53	54.9	77.2	41.8	1-3
5 Cr—½ Mo.	Anneal 1650° F.	.09/.11	.48/.53	.020/.021	.018/.020	.32/.33	4.90/4.96	.46/.46	30.3	68.1	48.8	5-7
Deox. Acid Bess.	As-rolled	.15/.17	.39/.40	.090/.091	.026/.026	.19/.20	....	....	49.1	74.3	38.2	..
Si-Al Killed O.H.	As-rolled	.28	.55	.018	.023	.13	....	....	42.1	73.2	39.5	..

objectionable with reference to notch impact tests at low temperature.

With exception of the silicon-killed open-hearth steel, normalizing did not appreciably change the grain coarsening characteristics of the various steels tested. The semikilled and silicon-killed open-hearth steels and electric furnace chromium-molybdenum steels were coarse grain at pipe fabricating temperatures. The deoxidized acid bessemer steel was fine grain at all the temperatures investigated. Silicon-aluminum killed open-hearth steel coarsened at approximately 1850°F and therefore grain size during fabrication would depend upon the temperature of the pipe. Grain coarsening characteristics are particularly signficant with reference to embrittlement for all of the steels tested except deoxidized acid bessemer steel. This is a factor to be considered in the hot fabrication of pipe. Results suggest normalizing after fabrication except for the coarse grained semikilled and silicon-killed open-hearth steels if embrittlement due to a coarse grain structure is to be avoided. Carbon steel pipe is usually marketed in the as-rolled condition.

Results indicate that deoxidized acid bessemer steel had a uniform grain size over a temperature range of 1550 to 1950°F. This is significant with respect to the hot finishing temperature of pipe as it leaves the seamless mill. Uniformity in grain size whether the grains be large or small, indicates uniformity in the product with reference to certain fundamental properties. In this respect, deoxidized acid bessemer steel is superior to all steels tested.

Charpy impact properties of various types of steel normalized at 1950°F are shown in Fig. 3 (c and d). A normalizing temperature of 1950°F was selected because of the relationship of this temperature to conditions encountered in the hot fabrication of pipe. Capped steels in the as-rolled condition are also included in Fig. 3 (c).

Although the transition temperature is not shown in Fig. 3 (c), the results clearly indicate that as-rolled capped acid bessemer and open-hearth steels were brittle at temperatures of 0°F to —50°F. Normalizing these steels at 1950°F lowered the impact properties at 75°F, due primarily to grain coarsening and did not appreciably change the embrittlement characteristics of 0°F to —50°F.

Grain Coarsening More Pronounced

Results in Fig. 3 (d) for material normalized at 1950°F indicate that the silicon killed open-hearth steel was brittle at 0°F to —50°F. This is believed to be due in part to grain coarsening which was more pronounced than in the silicon-aluminum killed open-hearth steel, but did not occur at all in the deoxidized acid bessemer steel. The latter steels were not brittle at 0°F to —50F although the impact properties were lower in this temperature range.

In order to evaluate the impact properties of various types of killed steel currently used for the production of large quantities of seamless pipe, a comparison of the Charpy impact properties at various temperatures is shown in Fig. 3 (a, b,). The impact specimens were machined from seamless pipe. Material tested was in the condition it is normally furnished by the steel mill and for comparison purposes pipe was also normalized.

Seamless pipe, when it is specified for low temperature service, is normalized and not furnished in the as-rolled condition; therefore, this treatment is of interest, particularly for service at temperatures below —20°F.

Silicon-aluminum killed open-hearth steel shown in Fig. 3 (b) was superior to the silicon-killed open-hearth steel in a temperature range of —50 to 150°F. Normalizing both types of steel at 1650°F improved the impact properties, but this treatment did not change the characteristics of the silicon-killed open-hearth steel to any marked degree. Impact properties of the silicon-killed open-hearth steel are, in part, related to grain size and therefore normalizing did not appreciably improve these properties. The results in Fig. 3 (b) have long been recognized by manufacturers of seamless pipe; otherwise, it would not have been possible to supply carbon steel pipe for low temperature service.

Impact properties of deoxidized acid bessemer and 1/2 chromium-1/2 per cent molybdenum electric furnace steels are shown in Fig. 3 (a). The latter steel was included in the comparison because of its wide use in high temperature, high pressure steam power plant installations where it has given entirely satisfactory service. In the as-rolled condition, deoxidized acid bessemer steel is similar to stress relieved 1/2 chromium-1/2 per cent molybdenum steel. Normalized deoxidized acid bessemer steel has superior impact properties compared to normalized electric furnace and open-hearth steels. This may be explained partially on the basis of the uniform fine grain structure which is characteristic of the deoxidized acid bessemer steel.

Impact properties after cold working of deoxidized acid bessemer and silicon-aluminum killed open-hearth steel pipe, Fig. 2 (a, b) were evaluated by machining Charpy impact specimens from a strain tensile specimen. The material, after cold working, was

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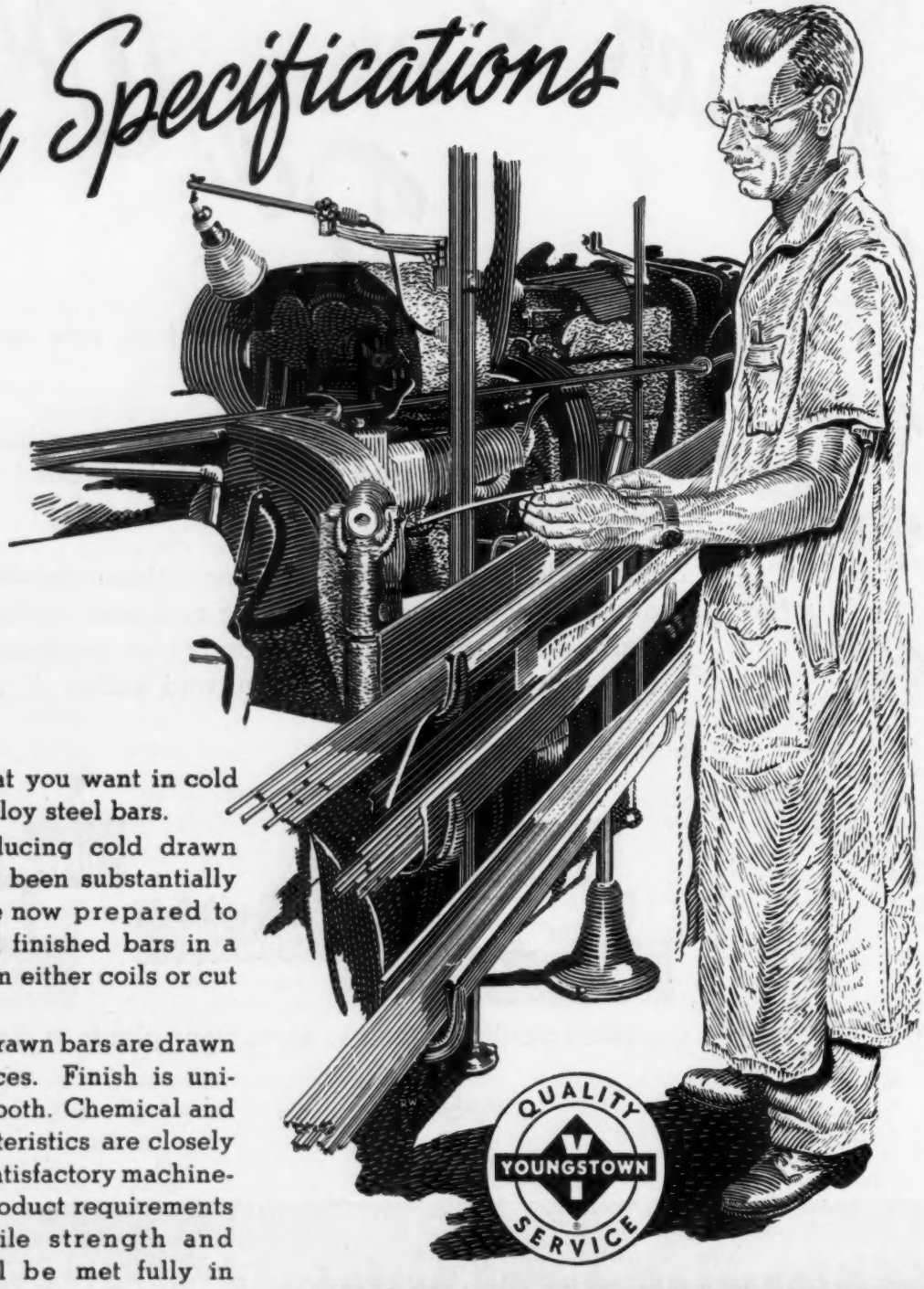

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tested in the following conditions: Unaged, aged 450°F, and aged 450°F followed by a treatment at 900°F. The purpose of the treatment at 900°F was to illustrate the influence of over-aging after cold working on the impact properties of the material. Temperatures exceeding 900°F would probably be more beneficial and are suggested as possible means for further reducing the embrittlement effects of cold work.

It will be observed in Fig. 2 (a, b.) that the impact properties for material cold worked and aged at 450°F were at a lower level compared to unaged and overaged material. The unaged material was not strictly in the condition described due to the time required for machining the specimens. Aging characterisics of the deoxidized acid bessemer steel were similar to the silicon-aluminum killed open-hearth steels in the as-rolled condition. It will be noted that the impact properties after cold working were essentially above 10 foot-pounds.

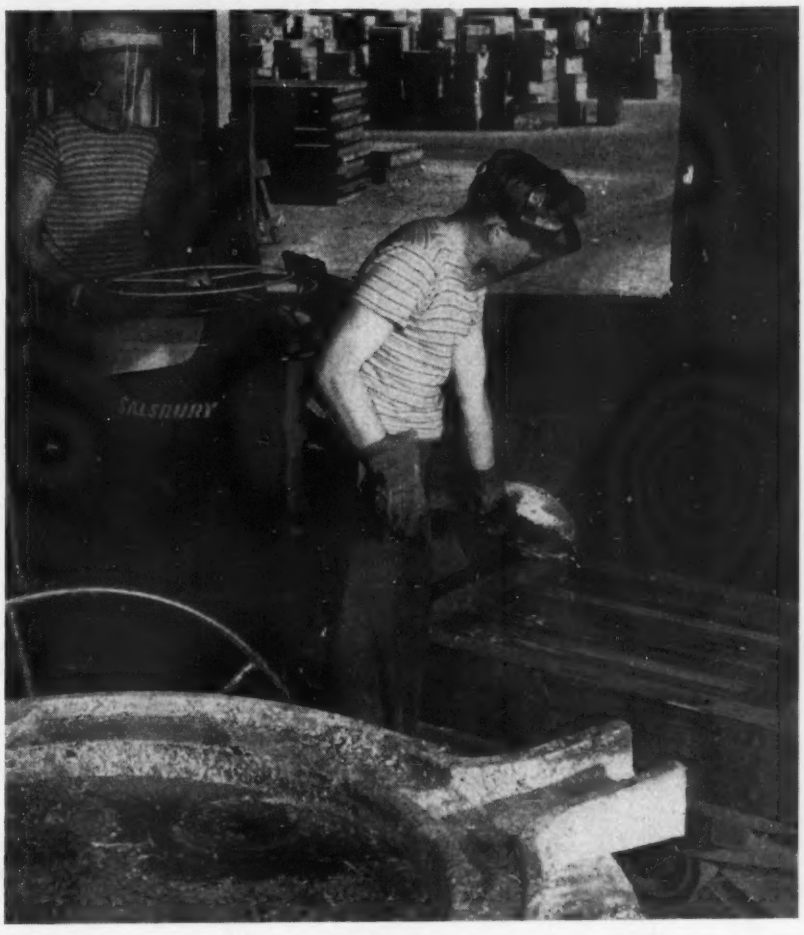
In addition to evaluating the impact properties of pipe cold worked in tension, a number of tapered bars from other heats of steel were cold drawn through a die. Results obtained after normalizing at 1950°F are shown in Fig. 2 (c, d). A normalizing temperature of 1950°F was chosen because of conditions encountered in fabrication.

Capped steels normalized at 1950°F in Fig. 2 (c) had low impact values after cold working and aging. The same steels in the as-rolled condition were similar to the normalized material. The silicon-aluminum killed open-hearth steel normalized at 1950°F in Fig. 2 (d) was superior to deoxidized acid bessemer steel due to the high normalizing temperature. The silicon-killed open-hearth steel had lower impact properties compared to the deoxidized acid bessemer steel. Apparently, the grain coarsening temperature was only exceeded with the silicon-killed open-hearth steel. Behavior of these steels normalized at 1950°F is not understood.

An evaluation of the embrittlement characteristics after cold working and aging of a number of different types of steel currently used in the production of large quantities of seamless pipe is shown in Fig. 1 (a, b.). Embrittlement characteristics were determined by making impact tests at ordinary temperature on cold drawn tapered bars machined from seamless pipe. All of the material tested was in the condition as it leaves the steel mill. The results, therefore, are based on properties which may be encountered in service if the material is cold worked. The various types of material included in Fig. 1 (a, b) have given satisfactory service over a period of many years in commercial installations and, therefore, may be considered suitable for the purpose that was intended.

Embrittlement or strain aging characteristics in the as-rolled condition of deoxidized acid bessemer steel, semikilled, silicon-killed and silicon-aluminum killed open-hearth steels are shown in Fig. 1 (a). All of the steels have similar properties. Steel in the normalized condition, particularly if silicon-aluminum killed, should possess higher impact properties after cold working compared to as-rolled material. However, normalized carbon steel pipe is not used for ordinary piping installation and therefore was not included in this part of the investigation. It should be noted that the impact results of the tapered bar specimens were considerably lower than those obtained from the cold worked tensile specimens.

Impact properties after cold working as-rolled material may vary appreciably if a large number of heats involving different deoxidation practices are investigated. Variations in finishing temperature on the seamless mill and other factors encountered in the manufacture of pipe from a steel ingot may influence embrittlement characteristics of the material. It is for these reasons that results reported in the literature have been largely based on normalized material as the influence of variations in the rolling of steel on embrittlement are little understood. When the steel pipe is normalized, certain properties imparted to the material may originate in the normalizing treatment. Factors involved in this treatment have never been thoroughly evaluated with reference to embrittle-



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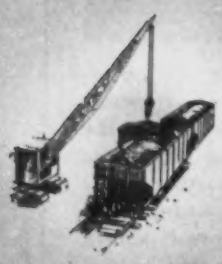

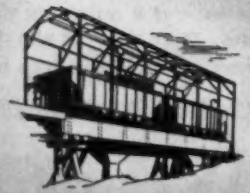

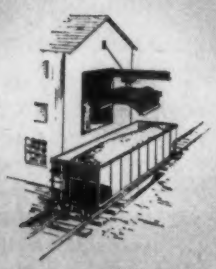

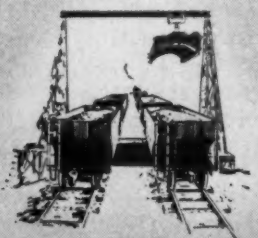

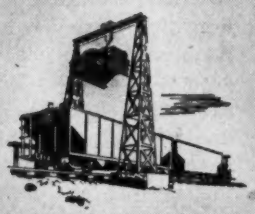

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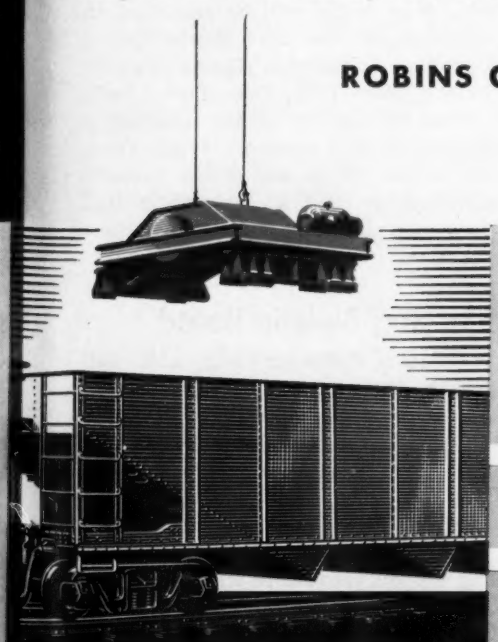

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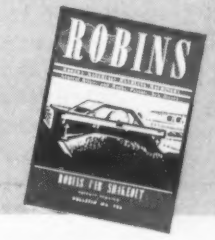

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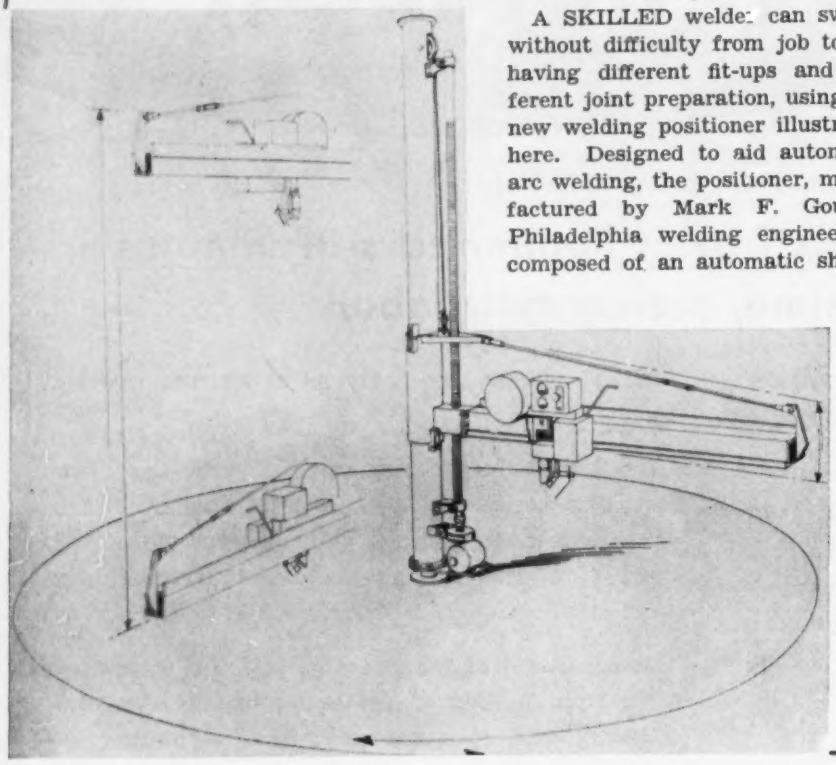

A SKILLED welder can switch without difficulty from job to job having different fit-ups and different joint preparation, using the new welding positioner illustrated here. Designed to aid automatic arc welding, the positioner, manufactured by Mark F. Gouran, Philadelphia welding engineer, is composed of an automatic shielded arc welding head, traveling on a beam, with the assembly rotating around a fixed axis. The traveling assembly is a Lincolnweld head and carriage made by Lincoln Electric Co., Cleveland.

The head moves on the beam to lengths of 10, 15 and 20 ft, while vertical operation of the head, which is powered by a motor-driven adjustment of the beam, covers an operating zone from the floor upwards to a height of 8 ft. Vertical adjustment is accomplished at a rate of 36 in. per min and permits inching the beam up or down to obtain the exact height for any particular welding operation. The beam, in its horizontal applications can be swung manually 360 degrees about its axis, varying in radii to the length of the beam.

Development of the "arc positioner" as the device is called, came about when a study of time-loss factors revealed that too many shut downs and operation lags were being encountered because of faulty materials handling. Delays caused by loading and unloading rigs are said to have been eliminated with the use of this new positioner.

ment due to cold deformation.

Normalizing, however, has served a useful purpose in providing a means for evaluating the influence of certain steelmaking practices on embrittlement after cold working which otherwise would not have been evaluated in the as-rolled condition. This approach, however, should not be exclusively used in the evaluation of the susceptibility to embrittlement or aging after cold deformation of material which is used in the as-rolled condition. In this latter case, we are more concerned with the actual properties of the material rather than the relationship of these properties to the steelmaking practice.

Embrittlement or strain aging characteristics of cold worked 1/2 chromium-1/2 molybdnum, 1 chromium-1/2 molybdenum, and 5 chromium-1/2 per cent molybdenum electric furnace steels are shown in Fig. 1. (b). The steels were selected because large quantities of seamless pipe rolled from these alloys are used for elevated temperature service. This material was tested in the condition furnished by the steel mill. It will be observed in Fig. 1 (b) that the electric furnace steels were brittle after cold working, but the impact strength was at a higher level compared to the carbon steels in Fig. 1 (a). Chemical composition of these steels is probably responsible for higher level of impact properties.

Conclusions, based on the steels investigated, follow:

1. Carburized austenitic grain size at 1700° F was consistent with the deoxidation practice employed, but independent of the steel making process. Capped, semikilled and silicon-killed steels were coarse grain and the silicon-aluminum killed steels fine grain.
2. Deoxidized acid bessemer steel had the highest grain coarsening temperature and the most uniform grain size.
3. Tensile test results at 450° F. indicated that as-rolled material was susceptible to age hardening. After normalizing at 1650° F., the deoxidized acid bessemer and silicon-aluminum killed open-hearth steels did not age harden at 450° F.
4. Charpy impact properties of deoxidized acid bessemer and silicon-aluminum killed open-hearth steels normalized at 1950° F. were superior to the capped and silicon-killed carbon steels.
5. Charpy impact properties in the as-rolled condition and in the absence of cold deformation were similar in a temperature range of —50 to 150° F. for the deoxidized acid bessemer, silicon-aluminum killed open-hearth and electric furnace steels. In the normalized condition (1650° F.) deoxidized acid bessemer steel had the highest impact strength.
6. Strain aging characteristics after cold working pipe in the as-rolled condition were similar in the deoxidized acid bessemer, semikilled open-hearth, silicon-killed open-hearth and silicon-aluminum killed open-hearth steels. Capped acid bessemer and open-hearth steels were at a slightly lower level and the electric furnace steels were at a slightly higher level compared with the other steels.

From a paper presented at the June 16-20 meeting of the American Society for Testing Materials, Atlantic City, N. J.

Glass Models To Be Shown at Exposition

Glass models of a 12-inch diameter conical ball mill and a Ruggles-Coles rotary dryer, built by Hardinge Co. Inc., New York, will be exhibited in operation at the 21st Exposition of Chemical Industries, Grand Central Palace, New York, December 1 to 6.

Also on display in the company's booth will be a constant weight feeder, driven by an electronic variable speed drive and an automatic mill feed control device called the "Electric Ear."

Belt Sag Bulletin Issued

Relation between sag and belt length is generally misunderstood, leading to an exaggerated idea of the difference in lengths between V-belts on a multi-Vdrive, states B. F. Goodrich Co., Akron, in a bulletin on that subject. The bulletin, available from the company, contains a table showing the differential in length between a belt which is tight and one which sags on the same drive. The company states that a careful examination of the figures will surprise most operators of such drives.

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Hardenable Steels

(*Continued from Page* 84)

this presentation, cracking is due to a number of causes, among which was the high static pressure of hydrogen coming out of solution during martensite formation. Absence of this hydrogen is an important point when hardenable steels are being fabricated.

During the war, intense interest in the welding of armor coupled with the necessity of reducing the tremendous drain on our alloy resources suggested the use of a mild steel low alloy electrode of the manganese molybdenum type for armor welding. Accelerated research soon showed that a lime base electrode could weld very hardenable armor plate without leaving underbead cracks. Thus the importance of the lime-ferritic substantially hydrogen free coatings was demonstrated quite clearly and opened the way for applications of this new electrode type in welding fields hitherto restricted to high preheating temperatures and also to the extremely meticulous welding procedures.

A few typical applications of lime-ferritic electrodes on practical welding jobs should suffice to indicate what these electrodes are doing. Rock drills used in granite quarries fail after fatiguing in service. These drills, which are 3 inches wide and ¾-inch thick, running 14 or more feet long, have the analysis given in Table IX.

Using 5/32-inch manganese molybdenum lime-ferritic electrodes with joint preparation and welding procedure shown in Fig. 11, a satisfactory weld was made in this material which would ordinarily be considered quite difficult to weld. Not only was the weld of good commercial quality but no preheating was used. Admittedly this might be taken as an overly optimistic claim. Therefore, a detailed analysis of just what happens seems to be in order.

As long sections of drill stock are placed in welding position, weight of parts is used to preserve alignment. First pass, which is put in rather heavy and which must completely penetrate to eliminate backchipping, is thick enough to withstand the normal shrinkage stresses of a structure that is under comparatively little restraint. The heat affected zone formed during the first pass is unquestionably hard. But the absence of stress and the freedom from hydrostatic hydrogen pressures results in a heat affected zone that is not cracked.

Welding continues rapidly. The only time lost is that necessary for removing slag. Succeeding passes perform two functions: 1. Temper the hard martensite already formed; 2. add to preheat put into joint by heat of welding.

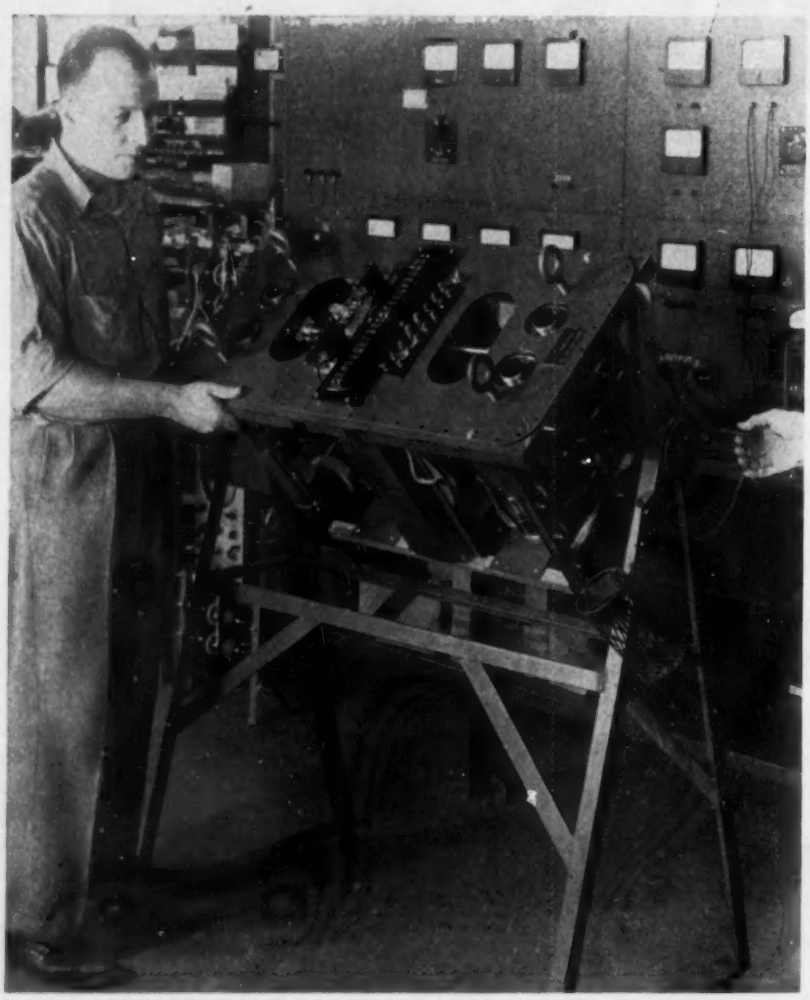
Finally, because of the speed of welding, an interpass temperature of 500° F is achieved during the fifth pass.

Hardness exploration of the finished drill bit showed maximum hardness of 255 brinell, Fig 13, which certainly suggests good control of the hardness of the heat affected zone. But this in itself is no proof of the success of welding. Field reports on drill bits welded in this manner are quite satisfactory. Thus the application of lime-ferritic electrodes plus a certain metallurgical knowledge of causes and effects brings about a welding operation involving only one manhour of effort to complete the restoration of an expensive drill to worthwhile service.

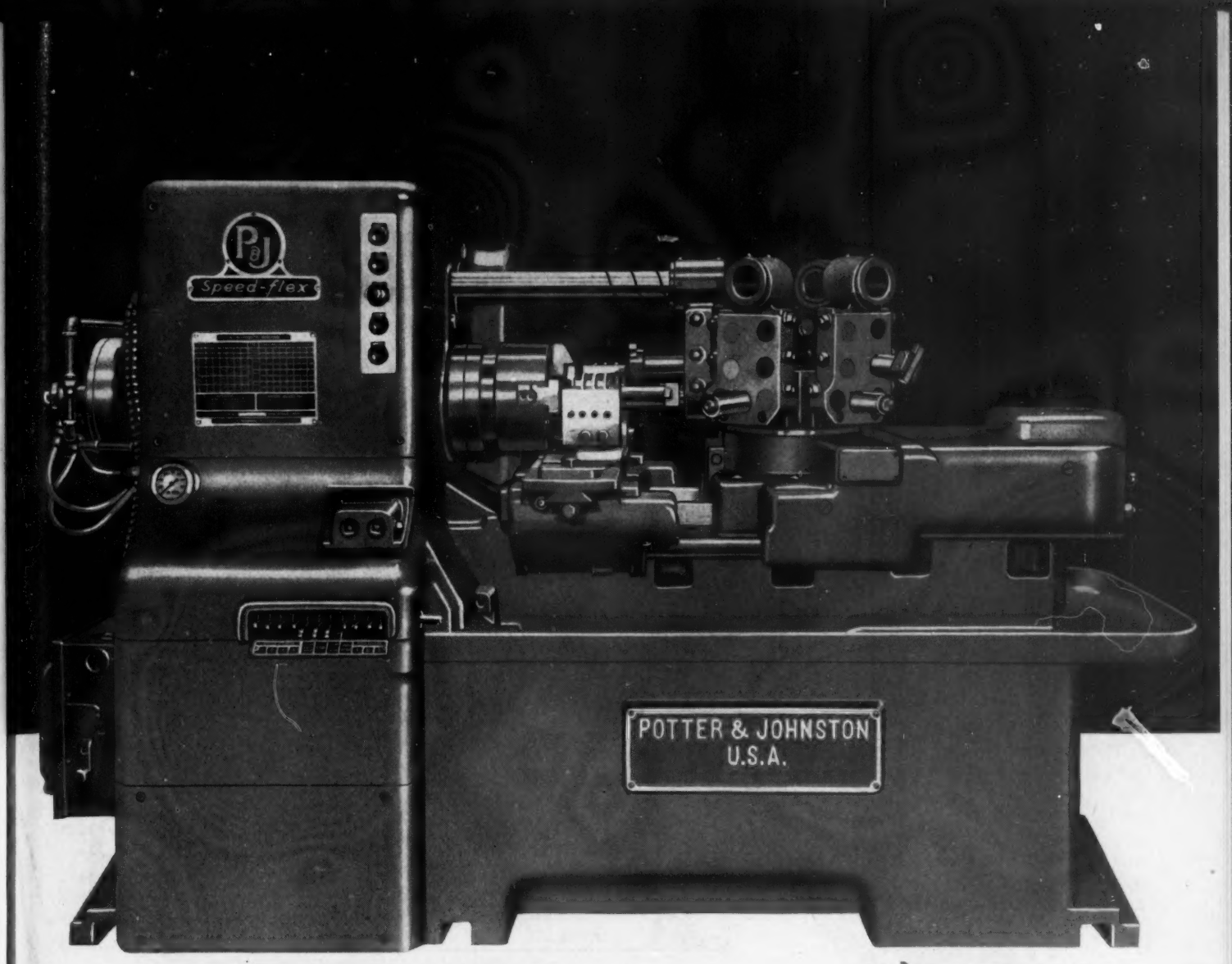
Hardenable steels are regularly encountered in certain types of wear resistant applications. Abrasion resisting steel of the analysis shown in Table X certainly contains enough carbon, manganese and silicon to be hardenable. However, some fabricating plants gave up when mild steel electrodes resulted in cracked welds and went to 25-20 stainless steel electrodes.

The 12-foot diameter dust catcher welded to 6-foot diameter pipe using abrasion resisting steel and illustrated in Fig. 8 is an example of the type of fabrication being accomplished with lime-ferritic low hydrogen electrodes on hardenable steels. These welds were made in all positions, were free of undercut and saved appreciable time and labor because expensive preheating or the use of special type electrodes were eliminated.

Ball mills constructed of this same abrasion resisting steel were regular-



ASSEMBLY AID: Handling of large x-ray transformers during various stages of construction is facilitated by this almost perfectly balanced mount designed at the Mt. Vernon, N. Y., plant of North American Philips Co. Inc. Made of angle iron stock welded at the joints, it allows 500 lb transformers to be held in any of four positions by insertion of small pin



Here is some **NEWS** that can be parlayed into profit.

Potter & Johnston's new

3-U SPEED-FLEX

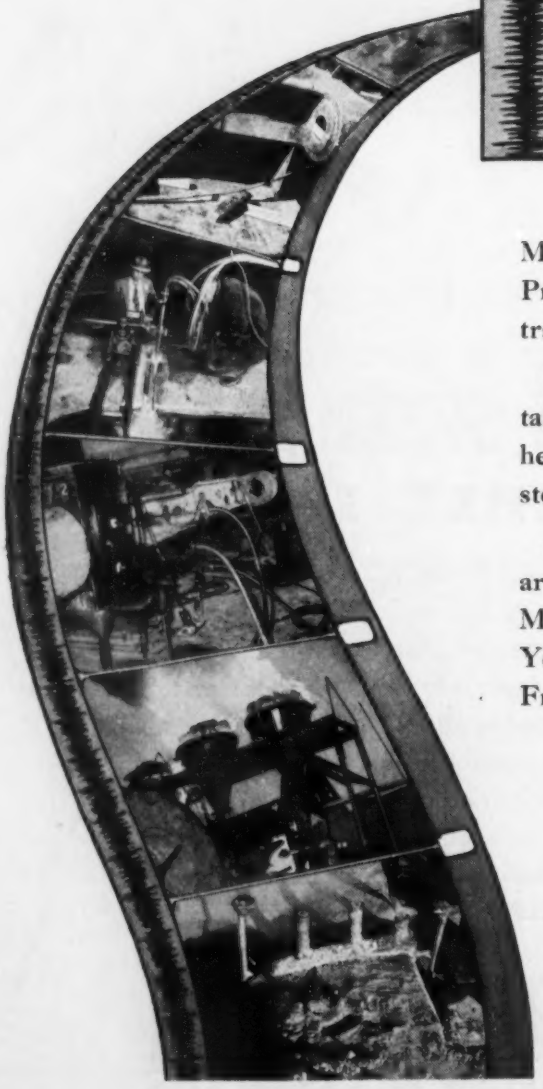
AUTOMATIC TURRET LATHE

Potter & Johnston's new 3-U SPEED-FLEX AUTOMATIC TURRET LATHE, lighter and more compact than any previous P. & J. model, occupies only 16 square feet of floor space, and handles the same size work at greatly increased speed. Here is a machine that has six turret faces, electro-pneumatic control, versatility of tooling, a wide range of spindle speeds, and is designed to machine castings and forgings—both ferrous and nonferrous—up to six inches in diameter. To management, this is good news, particularly when it is considered that the 3-U SPEED-FLEX is so fast, so accurate, and constructed to occupy such a minimum of floor space. These introductory notes are spot news; complete coverage on the 3-U SPEED-FLEX will be sent on request.

POTTER & JOHNSTON

MACHINE COMPANY, PAWTUCKET, RHODE ISLAND

MASS PRODUCTION OF MASSIVE PARTS



Metal & Thermit's new sound and color film, "Mass Production of Massive Parts", is an educational portrayal of the Thermit Welding Process.

Both interesting and helpful, this film shows the details and advantages of the process for fabrication of heavy parts of steel mill equipment, railroad rolling stock, ships and similar work.

Ask your nearest M & T representative how you can arrange for a *free* showing. Running time 24 minutes. Metal & Thermit Corporation, 120 Broadway, New York 5, N. Y., Albany, Chicago, Pittsburgh, So. San Francisco, Toronto.

THERMIT WELDING

ly fabricated with 25-20 stainless steel electrodes because of the troubles experienced with all other types. Changing to a lime-ferritic electrode resulted in an electrode cost less than one quarter that of the stainless steel products formerly used. This in itself would have been sufficient improvement to satisfy this company's engineering force. But in addition, the lime-ferritic electrodes using the same welding current that is selected for the so-called "hot rods" resulted in greater speed of fabrication.

One other example of the use of lime-ferritic electrodes for the welding of hardenable steels will be undertaken. For low temperature services, the advantages of nickel are widely recognized. At temperatures down to —150° F, 2 per cent nickel in a lime-ferritic electrode brings about impact strengths in the neighborhood of 25 foot-pounds. A typical analysis for such an electrode is given in Table XI.

Hardenable steels are being welded in considerably increased tonnages. The successful application of metallurgical principles easily checked through the Lehigh system, considered on the basis of austenitic transformations as developed by the S curve data, based on temperatures and mechanisms of martensite formation and taking full advantage of the lime-ferritic low hydrogen coated electrodes brings about sound weldments at appreciably lowered fabricating costs.

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Austenitic Manganese Steel

(*Continued from Page* 75)

Anyone interested in this theory should consult Barrett's book on the "Structure of Metals." After reading various theories one can conclude that the whole thing is in a state of flux, but that such a structural entity exists.

It has usually been considered necessary to have an allotropic transformation (martensitic) to account for the hardening of metals (aside from precipitation hardening). However, Hadfield and Hopkinson[3] found that these steels developed by Hadfield after suitable heat treatment plus cold work remained absolutely nonmagnetic.

J. H. Hall[3] reported that Bain had found some austenite converted into alpha phase when plastically deformed. It is not disputed here that this is not possible in view of the great instability of this material, but the small amount reported to have transformed certainly does not account for the tremendous increase in hardness when plastically deformed. Neither the allotropic transformation nor precipitation can, but the mosiac theory does account for it. While this was taken up in the previous paper,[1] additional proof will be offered here.

Hadfield also discovered that prolonged heating of the gamma phase at 500-600°F made the steel strongly magnetic and greatly increased in hardness. An attempt will be made to show that the physical changes can be explained by the mosaic theory concept. Sauveur[4] has already demonstrated that the allotropic theory explains why the material becomes strongly magnetic but fails to explain the great increase in hardness. Jeffries[5] confirmed Sauveur's belief by means of x-ray diffraction.

Niconoff,[6] by means of hardness tests and microscopic examination found that below 750° F no changes in the structure could be detected either before or after cold working. First change to be seen was carbide precipitation at the grain boundaries at 840° F. An increase in hardness was also reported.

To put these steels in their softest conditions, they are as a rule quenched in water from above A_3. This treatment holds the carbides (or carbon) in solid solution in the austenite. As stated above, prolonged heat treatment at suitable temperatures below A_3 will precipitate the carbide phase[6]. However, little or nothing at all has been reported in the literature on the effect of cold rolling on these structures.

These steels are used commercially in large tonnages because of their unusual properties possessed by no other alloy where parts are subjected to heavy abrasive pressures (such as steam shovel dippers and teeth, tractor shoes, rail and crossing frogs, rock crusher parts, etc). Under such use surface work hardens very rapidly, thus increasing resistance to wear without question related to the smallness of the mosaic elements generated by plastic flow. Another remarkable property of these steels is the large uniform extension over the entire length without necking.

Problems Investigated by X-ray Diffraction

Probably no other alloy of iron presents so many interesting properties for investigation as the Hadfield manganese steels. Considerable microscopic work has been carried out on this steel, but very little x-ray diffraction work has been applied to them. While the microscope can disclose a great many of the phase and structural alterations accompanying heat treatment and cold working, it remains for the x-ray method to complete the examination. In fact more information could be obtained by examining all of the specimens under the microscope and the x-ray. Inasmuch as most of the work reported in the literature has been microscopic, it was decided to limit this investigation to x-ray examinations only, one object being to illustrate how x-ray methods can be applied to problems of this kind.

It is well known that when these steels are made magnetic by heat treatment, hardness increases very sharply in spite of the fact that material is held at say 900° F for a prolonged time and cooled slowly in the furnace. The mechanism appears to be precipitation hardening. Can the x-ray disclose the structural changes which occur within the grains to account for the greatly increased hardness? It certainly does not seem reasonable to assume that increase was due to lattice distortion in view of the method of heat treatment but must be related to the size of the transformed alpha phase mosaic elements.

As a matter of fact Hadfield[3] considered other theories to explain the increase in hardness when these steels are made magnetic. He was inclined to believe that the alpha phase would make the steel softer, not harder. That the alpha phase transforms from the gamma phase is now well established[4, 5]. However, the great increase in hardness cannot simply be due to the allotropic transformation itself but to a much more fundamental reason.

Great increase in hardness due to cold working has been considered due to a substantial transformation of the gamma phase to the alpha phase (martensite). This does not appear tenable, in that the material remains completely nonmagnetic in a properly processed material. This was discussed in a previous paper[1] but inasmuch as some doubt was expressed by several discussing the paper, it was decided to present further evidence to support these conclusions.

In addition, the conditions required for the precipitation of the alpha phase by cold working; i.e., the heat

TABLE I

Film No.	Condition	Size	% Reduction	Monotron
	SPECIMEN B			
0	as heat treated	0.116″		
1	cold rolled	0.110″	5	28-32
2	cold rolled	0.103″	10	40-42
3	cold rolled	0.093″	20	50-55
4	cold rolled	0.070″	40	60
5	cold rolled	0.046″	60	65-67
6	cold rolled	0.036″	70	65-69
7	cold rolled	0.023″	80	70
	SPECIMEN F			
0	as heat treated	0.115″		20-23
1	cold rolled	0.113″	2	26-28
2	cold rolled	0.108″	6	31-33
3	cold rolled	0.103″	10	34-37
4	cold rolled	0.091″	20	40-46
5	cold rolled	0.080″	30	52-56
6	cold rolled	0.057″	50	58-65
7	cold rolled	0.034″	70	70-75

treatment necessary to put the steel in condition so that plastic deformation will decompose the gamma phase. Also, the effect of the alpha phase transformed on the ductility, toughness, and hardness. It should be mentioned that material quenched from 1800° F in water can be cold reduced 80 per cent without developing excessive edge checks or fracture. In spite of the hardness developed, it retains a considerable amount of ductility; for example, it can be bent to some extent in a vise before fracture.

Hadfield[3] and others[4, 6] studied the effects of heat treatments below A_3 on the physical properties and microstructure. In this paper the changes which accompany such heat treatments will be investigated by the x-ray method, and the effect of any structure changes on the cold deformation will be observed.

When heat treated above 1900° F and water quenched, a coarse grained austenitic structure is obtained, as is well known, and the material attains its minimum hardness. If subsequently heat treated at 900-1100° F the hardness is markedly increased. The x-ray should show the state of the alpha phase and the gamma phase from which it transformed.

In another group of specimens the effect of initial cold rolling on the gamma to alpha transformation and the hardness attained was studied. Cold working should have an effect and the x-ray diffraction method should show it, provided enough alpha phase and possibly carbide are precipitated. The phase diagrams[7] prepared by Gensamer, Wallis, and Wells show clearly the temperatures at which the various phases transform. The x-ray discloses whether these phases are fine or coarse grained, whether the carbon is in solid solution, and the amount of the various phases transformed.

Another point of interest was the effect of double heat treatment on the alpha phase (and carbide phase) transformation. Would the transformation continue if the second heat treatment were at a lower temperature provided the choice of temperatures used were favorable to the transformations involved?

Effect of air quenching instead of water quenching on the cold rolling properties was also investigated, and the structural changes followed by suitable x-ray diffraction methods. (7a). In the paper[1] (p. 626) already referred to, x-ray diagrams made by the surface diffraction method of this steel in its softest condition exhibited well resolved K doublets in spite of the fact that the specimens were water quenched.

This drastic cooling did not cause diffraction lines to become diffused and ill defined. Well-defined diffraction spots would infer that mosaic elements are large and dislocations not too great (well resolved K doublets). For if the mosaic elements were very small and the dislocations in the grain large, then the K doublets of molybdenum radiation would be diffused and overlapped. Surface diffraction diagram, Fig. 2, illustrates this type of crystal structure. The experimental details are given in the caption.

Only a small reduction in thickness is required to effect a very substantial increase in hardness. A reduction of 10 per cent will increase hardness from Monotron 30 to 40 (rockwell B-96 to C-36).

Effect of a prolonged heat treatment at 1100 and 1200° F on the x-ray crystal structure was also studied. Phase diagram[7] shows only phases present at various temperatures. However, the x-ray can aid in telling approximately how much of each phase is present. Certainly it can be depended upon to give the relative amounts of each phase and usually that is all that is required.

Another problem investigated was the effect on the cold rolling properties of this material when cooled from above A_3 to below A_3 in the furnace and then quenched some in water and some in air.

The Experimental Procedure: Hot rolled Hadfield manganese strip steel was used in this investigation. It was 0.115-inch thick, mill annealed to render it in its softest condition (gamma phase). It had the following chemical composition:

Carbon	1.35%
Manganese	14.00
Phosphorus	0.01
Silicon	0.45
Sulphur	0.04

Specimens requiring plastic deformation were rolled on a small laboratory two high mill. Specimens requiring long time heat treatment were coated with a graphite-sodium silicate compound to prevent oxidation and packed in an air tight box. After heat treatment any decarburized surface was removed by grinding followed by etching.

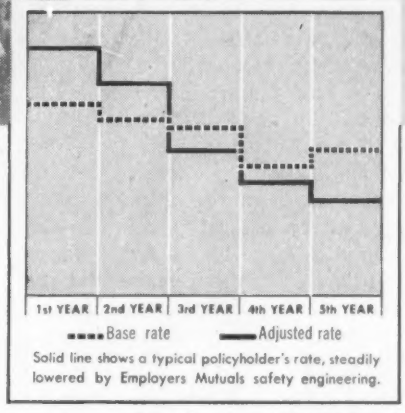
X-ray diffraction method most suitable for a study of this kind is the surface diffraction method, in that it is a very sensitive means of detecting small amounts of transformed alpha phase (or carbide phase) provided the diffracting particles are large enough and in sufficient quantity. There is evidence that in some instances finely dispersed carbides can be found on the x-ray film, but this will not be taken into account in this paper. However, it is most surprising to find how sensitive this method is when only small quantities are involved.

Fig. 4 is the surface diffraction pattern of a hot rolled steel in the austenitic condition and heat treated at 900° F for 72 hours. Hardness before heat treatment at 900° F was M (Monotron) 25-26 and after heat treatment it increased to M-38-43. Lines due to the alpha phase are indicated by the dots above or under each line. It can be seen that these lines are broader and of more uniform density than those due to the gamma phase.

On close examination one can see that lines due to the gamma phase are spotty and the K doublets in some instances are well resolved. This means that while the transformed alpha phase is very fine grained, the gamma phase is not materially changed. One can observe that a substantial quantity has transformed in 72 hours. Fig. 4 shows that by holding another specimen for 160 hours, more of the alpha phase transforms and it remains fine grained. Hardness increased to M-56-58.

Effect of cold work on the transformation was also investigated. A specimen in the austenitic state was cold rolled from 0.118 to 0.050-inch and then held at 900° F for 27½ hours. X-ray diagram, Fig 4c, discloses that this treatment not only

This is the type of press guard which provided the protection described herein.



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precipitated considerable alpha phase but carbide as well. Carbide lines are also clearly visible on film but difficult to reproduce in prints.

It is interesting to follow hardness changes after cold rolling. Hardness was M-65-68 but after heat treatment it dropped to M-59-62.

According to the theory advanced here, transformation alpha phase does not have the same crystalline size as the cold reduced gamma phase. Decreasing hardness is believed to mean that the mosaic elements are larger in the transformed alpha phase. In other words, whether it is gamma or alpha phase is not the only consideration, but the mosaic element size is very important insofar as the hardness is concerned.

Another specimen was processed to find out the effect of a second annealing at a considerably higher temperature. Specimen was cold rolled from 0.118 to 0.050-inch which increased hardness to M-65-68 and decreased grain size of the gamma phase. After tempering at 900° F for 49½ hours, hardness was M-58.

Second heat treatment was at 1300-1400° F for 2½ hours. This decreased hardness to M-35. Diffraction lines of alpha and gamma phases were sharpened considerably as can be seen in Fig. 4d. It appears on close examination that the gamma phase experienced the greater growth of the mosaic elements and more perfect alignment of these elements.

Several x-ray diffraction patterns were made of small samples of Hadfield manganese steel which had been water quenched from above A_3. In this way a pair was found, one with and one without alpha phase determined by x-ray examination. These two specimens were cold rolled as shown in Table I.

Starting specimens were tested for alpha iron with powerful alnico magnets and neither indicated the presence of alpha phase. However, the x-ray diffraction method did show that one of them did have some retained alpha phase. The x-ray diagrams, Fig. 1, made of each cold reduction are compared with the starting strip. X-ray diagram O-F does not indicate any alpha phase while specimen O-B has retained a sufficient amount of alpha phase to be detected on the x-ray film.

On comparing this series of x-ray diagrams (Fig. 1a and 1b), one can see that the alpha phase persists in the series in which this phase was originally present in the starting strip. It should also be noticed that the specimen free of alpha iron work hardened more (M-70-75) than the one having retained the alpha phase (M-65-69). Does this mean that the alpha phase, if present, even in small amounts, will reduce the maximum hardness attainable? If this is true, then the presence of the alpha phase in the as quenched material is certainly undesirable in commercial applications.

A very noticeable effect accompanying cold working is the increase in line width and loss of line intensity, especially the higher order lines. (See x-ray spectra). Also due to the orientation developed by cold rolling, one should notice that the (211) line gradually disappears and the (200) line increases in intensity. The line due to the alpha phase which persists is the (200). Its position is also indicated. Beside the alpha phase, some of the carbide lines are also present on the B series of Fig. 1. It may well be that some of the ferro-magnetism is due to the carbide phase.

From evidence presented here, it is believed that no alpha phase is produced by plastically deforming the gamma phase. At any rate the alpha phase does not account for the hardness, if present. In fact it reduces it! The strongest support for this point of view is the fact that the specimen (O-B) did not show any increase in the alpha phase by cold rolling. The alpha phase initially present in the gamma phase merely persisted as would be expected.

It was found by experiment on a number of specimens heat treated in various ways that the alpha phase could actually be precipitated during cold rolling. The following procedure gave the result looked for: A small specimen of nonmagnetic Hadfield steel was cold rolled from 0.118 to 0.050-inch. Hardness increased from M-25-27 to M-63-68, and the material tested nonmagnetic. It was heat treated at 1400° F for 24 hours and cooled slowly in the furnace. After this heat treatment the specimen was found to be slightly magnetic and the hardness dropped to M-35-40.

X-ray diagram, Fig. 3 shows that the material is still essentially gamma phase, but that a considerable amount of carbide has precipitated. Carbide lines are quite sharp and intense. Their position is indicated on the film.

Final step was to cold roll it from 0.050 to 0.030-inch. X-ray diagram after cold rolling gave a pattern exhibiting only alpha iron lines and carbide phase. Material was now strongly magnetic and hardness increased from M-35-40 to 63-66. During cold rolling considerable edge cracking developed which seems to be characteristic of the alpha phase in that several samples prepared in this way all cracked. This was confirmed independently by one of the members of this laboratory. It should also be pointed out that prolonged heat treatment at 1400° F should only precipitate the carbide phase from the gamma phase[7].

(To be concluded next week)

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8. Norman P. Goss, Tech. Pub. 1218, p. 257, AIME, Aug. 1940.
9. L. Bragg, *Some Problems of the Solid State*, Bul., Iron and Steel Inst., No. 121, p. 12A, Jan., 1946.

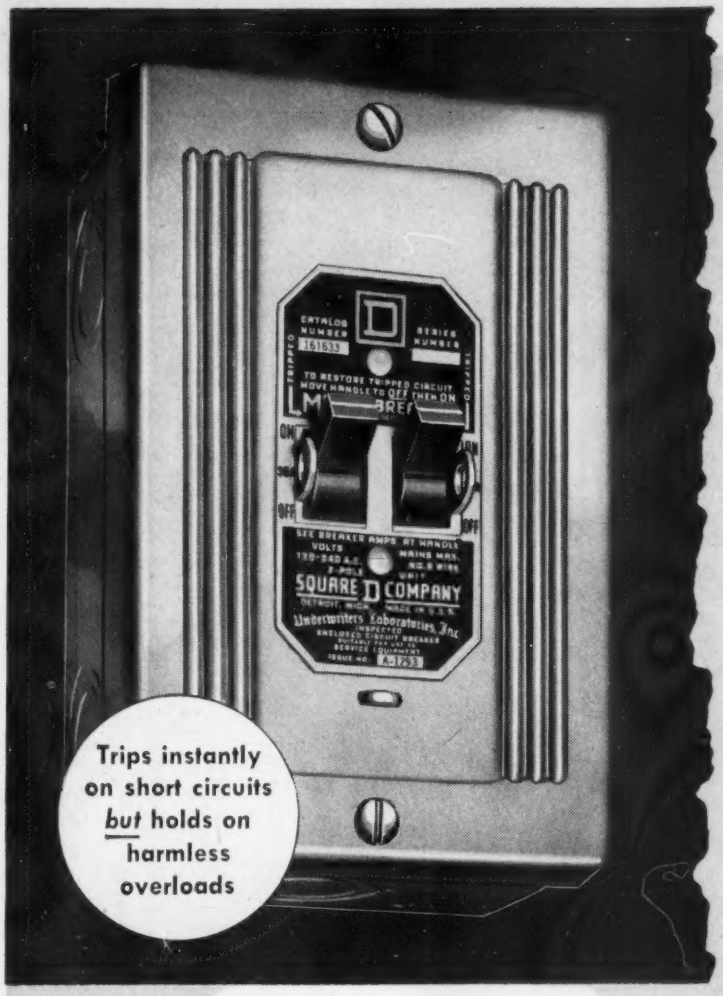
Fatigue Life Increased By Three Methods

Fatigue life can be increased by raising the endurance strength of the steel by shot-peening, rolling at localized stress areas or by heat treatment, stated O. J. Horger, chief engineer of the railway division, Timken Roller Bearing Co., Canton, before a recent meeting of the Dayton Chapter of the American Society for Metals. Speaking on "Metallurgy and Design," he said that the endurance limit of a shaft has been raised from 15,000 to 43,000 pounds per square inch by shot-peening. Rolled threads are responsible for raising the endurance limit 2½ times by the empressed compressive stresses.

Rolling of railroad wheel tires has reduced failures caused by stresses on the inside of the tire, he asserted, stating that railroad car and locomotive axles now under cut and rolled at the point beside the wheel where the stress formerly was concentrated. This modification in shaft design is responsible for a 68 per cent increase in fatigue life without any increase in the weight of the part, he said.

New Speed Nut Uses Developed

Assembly of multiple coil forms on radios with one fastener which combines five Speed Nuts is but one of numerous special purpose variations of the system of spring tension fastenings introduced by Tinnerman Products Inc., Cleveland. The radio installation is said to have replaced eight separate parts and eliminated several operations. Another application reportedly performs three functions in the assembly of parking lamps—retaining the light socket, spacing the wires and fastening the entire assembly to the base.



Announcing

THE NEW 1 and 2-Pole Coilless THERMAL-MAGNETIC TRIP MULTI-BREAKER TYPE MO2

2-Way Protection for Circuit Wiring

The magnetic trip functions in 1/50 to 1/100 of a second even on minor short circuits. This magnetic trip feature is combined with the time-tested thermal bi-metal element which provides time-delayed tripping on moderate overloads.

These breakers are furnished in 1947 N.E.C. ratings of 15, 20, and 30 amperes —120/240 volts, A.C., flush or surface types.

With groundable insulated neutral, these Multi-breakers are Underwriters' approved as service entrance equipment as well as for general use on lighting and appliance circuits.

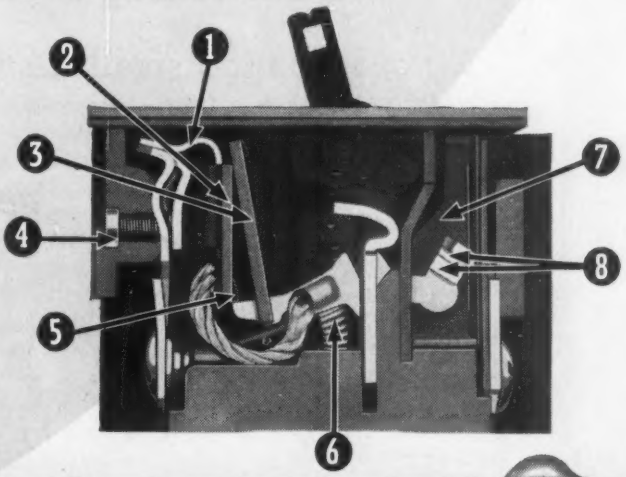
NEW MO2 IDEALLY SUITED FOR

—Serving lighting and appliance circuits in homes, stores, offices, factories, farms.

—Service entrance equipment in small dwellings, cottages, stores, and for farm and dairy buildings.

BREAKER UNIT FEATURES

1 Bimetal for thermal trip
2 Magnetic yoke (*coilless*)
3 Magnetic plate armature
4 Screw for bimetal adjustment (*sealed*)
5 Stainless steel sensitive latch
6 Compression spring provides contact pressure
7 Arc suppressor chamber
8 Silver-tungsten contacts



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THE WORLD'S LARGEST *and Fastest* JOB GALVANIZING PLANT

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Pittsburgh, Pennsylvania

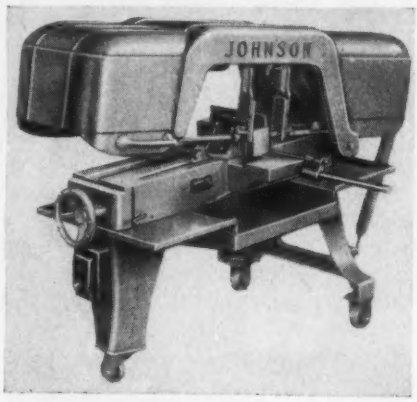
New Products and Equipment

Additional information on the new products and equipment described on this and succeeding pages may be obtained, without obligation, by checking appropriate numbers on the cards following page 126

1. Horizontal Band Saw

Johnson Mfg. Corp., 624 Chrysler Bldg., New York 17, N. Y., announces a wet model horizontal band saw of 10 x 18 inch capacity, for production cutting. Maximum cutting efficiency is possible without impairing simplicity of operation.

Coolant flow, from a continuously operating unit, plays directly on cut



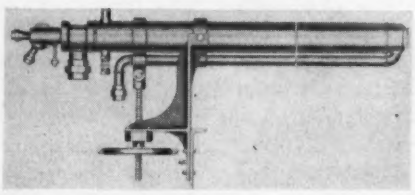
as nozzle is fastened to back of front saw guide. Pump starts and stops automatically as it is integral with the machine. It may be disconnected for dry cutting. Removable coolant receptacle may be pulled completely out for cleaning and draining.

2. Turning Chisel

Brass, bronze, aluminum, magnesium, copper, nickel, silver, plastics and wood may be turned free hand with the tungsten carbide tipped turning chisel announced by Delta Mfg. Division, 776 East Vienna avenue, Milwaukee 1. Chisels are offered in four nose styles: ⅛-in. square, ⅛-in. round, ¼-in. square and ¼-in. round.

3. Water Cooled Burner

Designed to place atomized fuel in furnaces for speeding up the melt, the new artillery type water cooled burner for steel mill furnaces, made

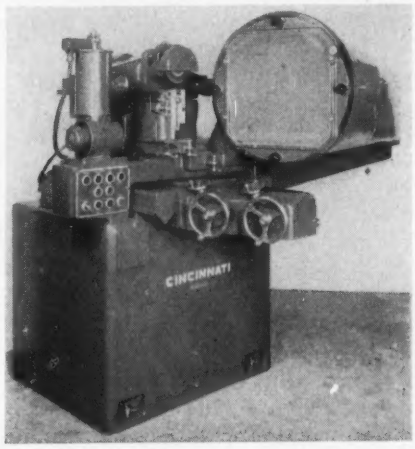


by Crowe Engineering Co., Cincinnati, O., is made specifically for the furnace in which it is to be installed.

Burners of this type operate equally well with oil or pitch and gas combination. An adjustable atomizer completely atomizes the fuel, ejecting it in a fine spray, resulting in perfect combustion of fuels and a marked decrease in time required per melt.

4. Grinding Machine

Extremely accurate small profile shapes may be produced with the Projecto-Form grinding machine, manufactured by Cincinnati Milling Machine Co., Cincinnati 9, O. It provides an optically enlarged image of



the work which may be compared as grinding progresses, with a previously prepared, enlarged scale master drawing.

A powerful bulb and a set of condenser lenses focuses a brilliant flood of parallel rays of light across the top surface of the workpiece. On the opposite side of the workpiece and having it in its plane of focus, is a precise optical projection lens system which throws a greatly magnified silhouette image of the work profile on a ground glass viewing screen. Standard magnification is 20 to 1 with 40 to 1 optional.

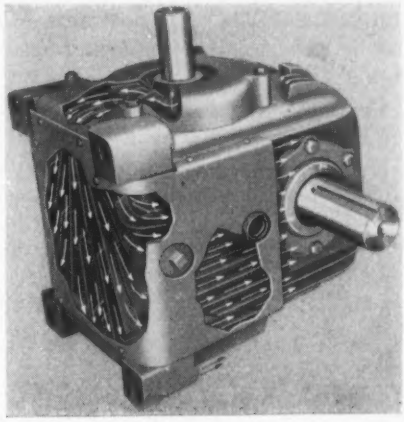
Master drawing, an enlarged, true scale duplicate of the desired work profile is mounted behind and in contact with the viewing screen to permit comparison with the projected image. The workpiece may be positioned in relation to the optical system by means of longitudinal, transverse and vertical slide and a swivel movement of the work platen. Grinding wheelhead is carried on transverse and vertical slides. Extremely fine adjustment of the grinding wheel is possible. Length of stroke is adjustable and its speed in each direction is infinitely variable.

5. Welding Rod

All-State Welding Alloys Co. Inc., 96 West Post road, White Plains, N. Y., announces a No. 53 low temperature welding rod for use on zinc-base die castings. Available in a 3/32-in. diameter, round form, which has been found suitable for most applications, it is easy to apply and has a working temperature of 400° F and a shear strength of 25,000 psi. Usable with or without flux, it gives a color match.

6. Speed Reducers

Fan cooled speed reducers with center distances of 4, 5, 6 and 8 inches and ratios of 5, 10, 15, 20, 25, 30, 40, 50 and 60 to 1 are announced by Cone-Drive Division of Michigan Tool Co., 7171 East McNichols Rd., Detroit 12,



Mich. Horsepower ratings apply equally to mechanical or thermal ratings. Standard heavy duty pinion-under Cone-Drive speed reducers may be converted to fan cooling by the addition of fan and air flow control shields, making them identical with the newly announced units.

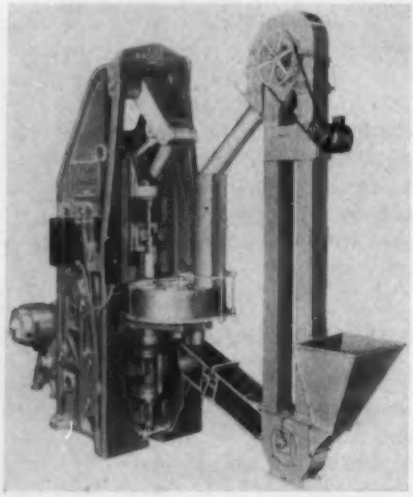
Shields direct fan-impelled air over the finned lower portion of the speed reducer housing. Fins are so located and shaped as to guide streams of air for maximum cooling efficiency.

High horsepower transmitting capacity of speed reducers is due to the nature of the gearing. Number of

teeth in contact varies directly with number of teeth in the gear, arc of contact being approximately 45 degrees in all cases. As a result, low unit loadings on teeth are obtained, resulting in increased load-carrying capacity for gear sets, longer life and smoother operation.

7. Preform Press

Developed for the production of preforms or tablets from those high bulk factor materials which cannot be automatically tableted on standard presses because of their high compression ratios and poor feeding characteristics, the model 67 preform press, made by Kux Machine Co., 3940 West Harrison street, Chicago 24, can handle materials with compression ratios up to 12 to 1.

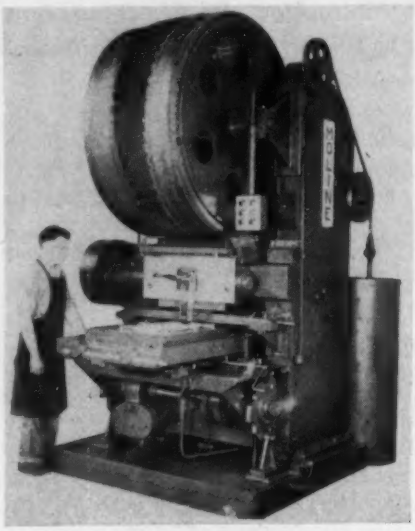


Complete machine cycle is automatic and continuous with a production of up to 20 tablets per minute under pressures as high as 75 tons. Maximum diameter of tablets is 4 in. and maximum depth of fill is 8 in. Up to 10 hp is required for the machine which requires a floor space of 6 x 12 ft.

8. Multispindle Drill

Model CF140 special 29-spindle machine for automatic drilling, announced by Moline Tool Co., Moline, Ill., is capable of drilling approximately 3700 holes in an ellipse-shaped aluminum header plate measuring about 25 1/4-inches on its major axis and 13 3/4-inches on its minor axis. Holes drilled are of slightly less than 1/4-inch diameter and are drilled in rows where center to center distance is 1/4-inch. Rows of holes are slightly less than 1/4-inch apart, being drilled in a staggered fashion.

Machine is synchronized with indexing of work table. Spacing of spindles is such that every third hole in a row is drilled at one pass of the drills. Thus table must index sideways twice to complete each row. Spindle selector

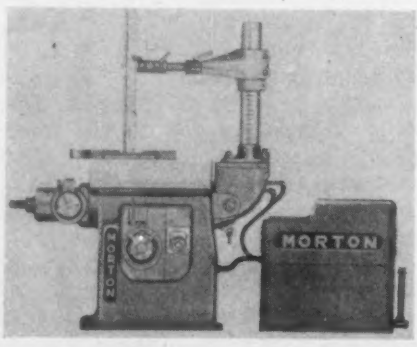


drum has no motion either vertically or horizontally. It is indexed so that it turns on its horizontal axis at each pass of the drills. Each indexing motion brings a new row of holes in the spindle selector drum into position directly above the drill spindles. Work table is moved up and down by cam action to produce rapid traverse and feed.

Rail carrying the drill spindles is mounted on same slide with the table. Thus when table moves upward, drill moves in same direction at same speed. At point where feed begins and upper ends of spindles reach the drum, upward motion ends for any spindle which contacts a plug inserted in a hole in the drum above that spindle. Consequently selected spindles drill holes. This continues through all indexing cycles until operation is complete, when machine shuts off.

9. Keyway Cutter

Hydraulically driven, the new keyway cutter and slotting machine, made by Morton Mfg. Co., Broadway

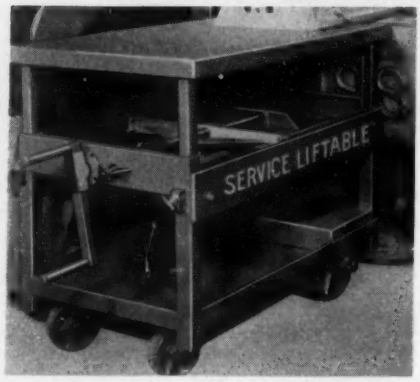


and Hoyt, Muskegon Heights, Mich., is available in 18 and 24-inch stroke sizes. Top plate is provided with six accurately machined T-slots which form a surface for securing the rapid binding attachment for holding down work. Top plate is stationary, necessary taper being secured through tilting cutter bar which makes possible tapers up to 1/2-inch per foot forward or 1 inch per foot backward.

Automatic feeds give a variable rate of incremental feed from 0.001 to 0.020-inch per stroke. Automatic relief to the cutter bar on its return stroke is provided. Operating height from table to floor is approximately 40 inches. Cutting speed range is 10 to 25 feet per minute with a quick return speed of 75 feet per minute.

10. Die Lift Table

Handling of dies is facilitated with the Liftable, built by Service Caster & Truck Corp., Albion, Mich., which works with the dies in three ways: Takes them from storage shelves;



rolls them to the press; and lifts them to press level. Capacity is 2000 lb. It may also be used as a bench, or truck as well as a lifter.

Lowered, the top is 28 in. from the floor; raised, it is 42 in. from the floor. It is of all welded construction with chain and screw lifting mechanism. Table top is 3/16-in. steel plate, turned down 2 in. over an angle steel frame and measuring 26 x 43 in. It is available with rubber, plastic or metal wheels.

11. Loading Device

Use of vibration for aligning screw blanks or similar parts and introducing them into the machine is made in the vibration type loading device developed by Landis Tool Co., Waynesboro, Pa., for their centerless and centerless thread grinder. As there are no mechanically moving parts other than those for setup adjustment, wear due to friction is confined solely to contact surface between blanks and hopper.

Inside the hopper blanks move up a circular inclined ramp on inside face until they enter the feed tube at top of hopper. This relatively long path of travel aids in aligning blanks before they enter the feed tube. A rheostat knob on the front panel provides

a means of adjusting rate of feed speed.

Blanks which are equal in length and diameter may be handled by the loader. Four hoppers, each handling three sides of blanks, cover a range of sizes up to 5/8-inch diameter. Mounting bracket has adjustments for aligning feed tube with grinding throat as well as permitting loader to be pivoted away from machine.

12. Aluminum Ladder

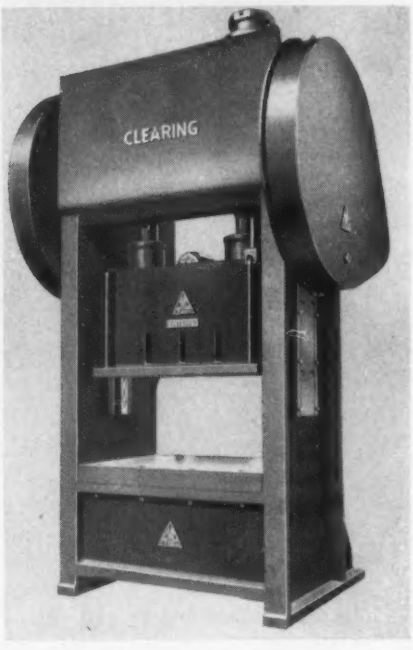
Designated as model DLL, a new aluminum ladder weighs slightly over 1 lb per foot. Announced by Aluminum Ladder Co., Carbis street, Worthington, Pa., it has corrugated rungs which insure safe footing and will withstand a 250-lb load. Sizes range from 6 to 16 ft lengths and two of the 8, 10 and 12 ft lengths may be joined to form an extension ladder.

13. Brazing Tips

Three new multiflame brazing tips, announced by Air Reduction Sales Co., 60 East 42nd street, New York 17, are for use in silver brazing, high temperature brazing and in application of hardfacing alloys. Style 721 is a light, compact multiflame tip brazed to end of a short flexible copper extension and is available in sizes 5, 6, 8 and 10. Style 722 is a dual tube tip brazed to a flexible copper extension, offered in sizes 5 and 7. Style 723 tip is for operations where operator should be farther away from the work. It is identical with other two but is to be used with a standard 10 in. flexible extension tube. All operate on various gas combinations.

14. Straight-Sided Press

Capacities from 60 to 250 tons, all welded steel frames and electrically operated air friction clutch interlocked with a spring actuated brake are features of the series S straight sided presses, manufactured by Clearing Machine Corp., Chicago. Bed



widths, right to left, are from 36 to 108 in. in increments of 6 and 12 in., while any of these sizes may be had with bed depths, front to back of from 28 to 44 in. Stroke lengths may vary from 3 to 18 in. and shut heights are available over a large range.

Slide adjustment is of barrel type in which screw is not subject to bending as it is supported top and bottom in a cylinder or barrel. Two separate connecting screws are geared together to maintain uniformity of adjustment. Adjusting mechanism may be operated by hand or by electric motor. Presses are double crank type, with twin end drive.

15. Aluminum Cleaner

Designed for cleaning aluminum, a new cleaner manufactured by Optimus Detergents Co., 152 Water street, Matawan, N. J., is a blend of medium duty alkaline cleaner, including water softening materials and inhibitors to prevent attack on the metal. Effective for cleaning dirt, grease and oil, it will also clean die castings, brass, bronze, pewter, etc., when used as a soak cleaner. Containing a wetting agent, the cleaner, No. 101A, may be used in small concentrations with temperatures ranging between 140 and 180° F.

16. Water Softening Zeolite

New resin zeolite, designated as Liquonex CR, which is an exchange material with a high capacity and therefore permits higher flow rates per square foot of area, is a development of Liquid Conditioning Corp., 114 East Price street, Linden, N. J., for water softening. It practically eliminates hardness of raw water, leaving only 0 to 2 ppm of calcium carbonate (hardness). New material is nonsiliceous and carbonaceous, making it suitable for treating of boiler feed water.

17. Skid and Skid Box

Phillips Mine & Mill Supply Co., Pittsburgh, Pa., is manufacturing a new skid and skid box, designated as the Phil-Tier skid and Phil-Tier box. Both are designed for hauling and

storing all types of industrial parts, products, scrap, etc. They may be used with either platform or fork lift trucks.

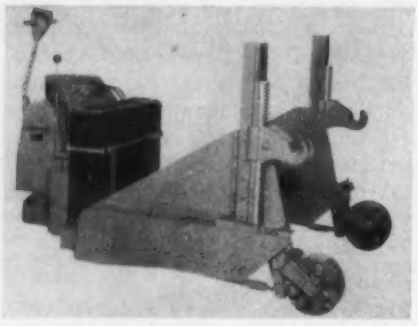
Skid is an open unit which provides easy access to materials when skids are stacked. Box is used for storing or moving materials that do not lend themselves to neat piling. Units may be stacked separately and interchangeably as illustrated.

Features include cupped feet, decks of double corrugated steel plate, and reinforcement of plates at top of

boxes. Both may be furnished to required dimensions, with provision for under clearance necessary for platform or fork lift trucks.

18. Reel Handling Truck

Designed to simplify reeling and unreeling as well as horizontal movement of cable, wire or hose, a modified version of the Transporter motorized hand truck, built by Automatic Transportation Co., 149 West 87th street, Chicago 20, will handle up to 6000-pound loads of



commodities wound on spools from 3 to 7 feet in diameter and to 33 inches in width. Reel handling mechanism consists of hooks which are adjustable in height for various size reels and mounted on locking gear racks in which the reel axle rests and hinged trailing wheels which raise the load from the ground when drawn forward by the truck's electric lift.

Truck is less than 7 feet long, shorter than the maximum diameter of the reels it handles. Built on a standard Transporter drive unit, the truck uses a standard 11-plate battery. Special models may be built for wider reels.

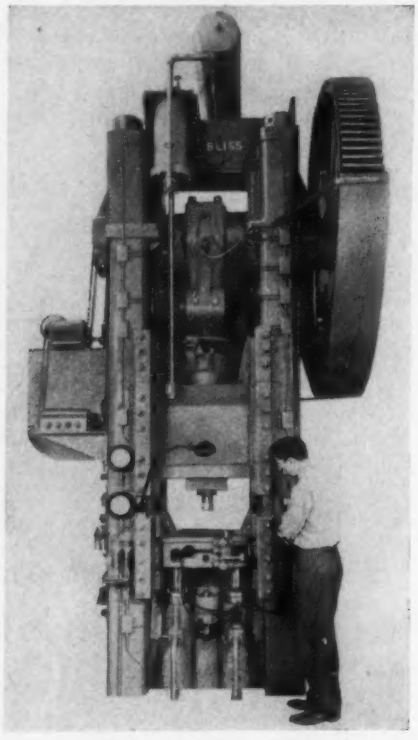
19. Pressure Gage

Nonaerated acetic acid, alchol, sodium acid sulphate, oxalic acid, carbon tetrachloride, tannic acid, sulphuric acid and other acids may be safely handled with the pressure gage for corrosion service manufactured by Jas. P. Marsh Corp., 2073 Southport avenue, Chicago 14. Made in several case styles and dial sizes, it has a lathe turned beryllium copper bourbon tube, copper locktite cones and tip and socket made from brass bar stock. Movement is bronze bushed.

20. Briquetting Press

Extension of metal powder application to large, irregular cross sections is possible with the briquetting press manufactured by E. W. Bliss Co., 450 Amsterdam avenue, Detroit 2. Embodying triple hydraulic lower motion — floating die table, core rod and stripper—the No. 309 press produces large, complex powdered metal parts to close tolerances.

Uniform density is assured by the hydraulically controlled floating die table and core rod rams which recede against pressure that is predetermined. Mechanically actuated slide has a 10-in. stroke, adjustable to 5 in. It has an adjustable cam which actuates the powder hopper. Slide speed may be adjusted from six



to nine strokes per minute and from 9 to 18 strokes per minute by adjusting speed control of a variable speed motor and shifting through a two-speed gear box.

Capacity of slide is 345 tons, die table 120 tons, core rod 60 tons and stripper 75 tons. Stroke of slide is 10 in., die table 3 in., core rod 3 in. and stripper 6 in. All strokes are adjustable.

21. Air Engines

Differential principle employed in the new air engines of various sizes and ratings made by National Pneumatic Co., Rahway, N. J., permits operation with only one controlled air line, the con-

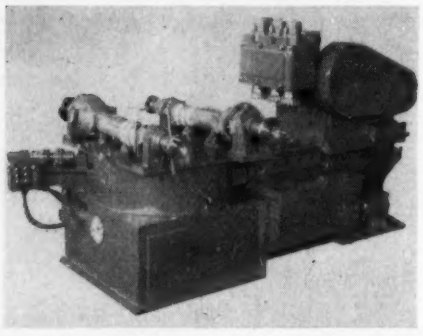
sequent simplicity in piping and controls making the engines desirable for use in multiple hook-ups or where controls are located some distance away. Air power is obtained in both directions, so that at 100 lb pressure, engines deliver in-stroke power ranging from 100 to 1335 pounds and out-stroke power from 105 to 1070 pounds.

Each engine has a piston assembly presenting two different diameters. Pressure acting on large and small ends of piston assembly results in a force equal to difference between the two areas of these ends. This force is exerted inward, toward the larger end. When air pressure is applied to large end of cylinder, it counteracts the effect of the constant line pressure acting on the opposite side of the large end of the piston. Outward force is then developed by constant line pressure acting against small end of piston assembly.

Strokes of 3, 6 or 9 inches are offered. Maximum space required for largest engine made is 29⅝ x 9¼ x 8 in. In air control valves, pushbutton, foot control, hand lever or solenoid valves for remote control are available.

22. Vertical Milling Machine

Three cutter spindles of the type VMI vertical milling machine designed by Davis & Thompson Co., 6411 West Burnham street, Milwaukee 14, are driven by a 20 horsepower motor, worm and wheel and a gear train to furnish spindle speeds of from 82 to 328 revolu-



tions per minute. Each cutter spindle has a micrometric vertical adjustment of 1¼-inches and two are mounted with interlocking cutters.

Intended for production milling of the two top pads on a clutch housing, the machine has a two-station hand clamping fixture mounted on a hydraulically driven indexing table. Same hydraulic cylinder locks table in place during the milling operation. Cycle of operation is fully automatic. Second station may be loaded while first is in machining position.

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Early Improvement in Steel Supply Situation Unlikely

With mills behind on commitments indications are consumers' receipts will not materially improve in last quarter. Outlook for metallics generally, especially pig iron, hints of even greater stringency in some directions. Buyers display increasing conservatism in ordering for inventory

STOP and go operations in the metalworking industries are in prospect over the remainder of the year with the outlook dim for any substantial improvement in steel supply conditions.

With fourth quarter at hand, steel producers are further behind on delivery commitments in the major products than at any time since the end of the war, except for the periods of severe strike disruptions last year, and despite determined efforts to effect better balance in order books there appears little chance consumers' tonnage receipts will show any marked gain over those of recent months.

The bald fact is the steelmakers, anticipating highly sustained production schedules and less delay in works expansion than was actually experienced, today find themselves oversold in many products and are forced to further cut customer allotments. As a result indications are interruptions in metalworking operations will continue to be experienced periodically in the metalworking industries due to unbalanced steel inventories.

Sheets, strip and pipe are extremely scarce and no improvement this year is expected in plate supply. Trade leaders predict the present stringency will continue well into next year, notwithstanding producers' efforts to reduce tonnage arrearages by the end of this year through conservative order scheduling.

There appears no particular assurance, however, that conditions will improve, although reports are heard of rapidly filling supply pipelines in some products which may have a salutary bearing on the situation, as possibly will reported increasing conservatism of buyers in ordering for inventory. As a general thing, however, there is little comfort for consumers in sight with the overall outlook in metallics, especially in pig iron, pointing to even greater stringency than in the immediate past.

While supply difficulties promise to prevent full use of available manufacturing facilities, indications are output of manufactured goods over the remainder of the year will at least equal that of earlier months. Output of some durable goods will register peacetime records this year, this being made possible to some extent by the fact steel supplies have been larger than at any time since the war ended.

At the moment the steel price structure is firm but threat of higher prices over coming months is seen in the request of the railroads for a 10 per cent emergency freight rate boost. Such an increase, if granted, would be reflected almost immediately in warehouse steel shipments and eventually in mill base prices since raw material costs would be affected. Scrap prices in all likelihood would reflect the advance immediately. Currently the scrap market is quiet with prices firm.

Sharp recovery of 27 points in steelmaking operations at Pittsburgh to 98 per cent of capacity coupled with increases of 3 points in Detroit and of 1½ points in Chicago to 94 per cent were recorded last week. At the same time, operations were 4½ points lower in Wheeling at 89 per cent and 2 points lower in Cleveland and New England at 90.5 per cent and 83 per cent, respectively. As a result a net gain of 6½ points to 94 per cent of capacity was effected in the national steel ingot rate.

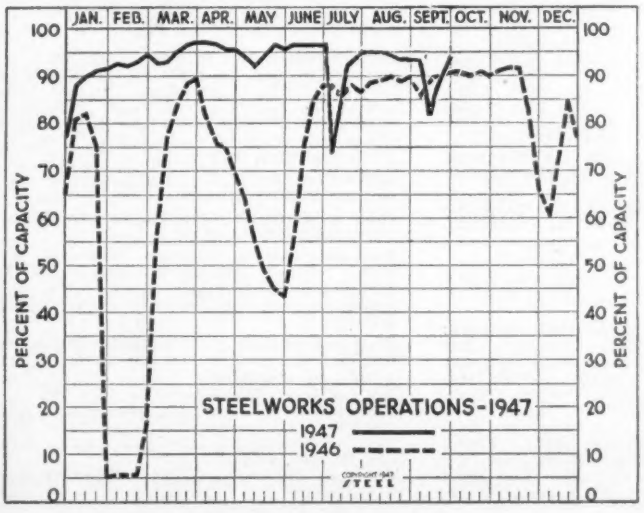
Although undertone of the scrap market was definitely stronger in some districts, STEEL's composite price average on steelmaking scrap held unchanged for the fifth consecutive week at $37.83. Other price averages also held unchanged at $36.13 for steelmaking pig iron, $75.41 for finished steel and $56.80 for semifinished steel.

DISTRICT STEEL RATES

Percentage of Ingot Capacity engaged in Leading Districts

	Week Ended Sept. 27	Change	Same Week 1946	Same Week 1945
Pittsburgh	98	+27	96	75
Chicago	94	+ 1.5	90.5	91
Eastern Pa.	92	None	81	76
Youngstown	92	None	90	80
Wheeling	89	— 4.5	93.5	88
Cleveland	90.5	— 2	91	83
Buffalo	88.5	None	90.5	86
Birmingham	99	None	99	95
New England	83	— 2	95	80
Cincinnati	94	None	84	86
St. Louis	78	None	72.5	68
Detroit	94	+ 3	81	85
Estimated national rate	94	+ 6.5	90.5	83

Based on weekly steelmaking capacity of 1,749,928 net tons for 1947; 1,762,381 net tons for 1946; 1,831,636 tons for 1945.



COMPOSITE MARKET AVERAGES

	Sept. 27	Sept. 20	Sept. 13	One Month Ago Aug., 1947	Three Months Ago June, 1947	One Year Ago Sept., 1946	Five Years Ago Sept., 1942
Finished Steel	$75.41	$75.41	$75.41	$75.41	$69.82	$64.45	$56.73
Semifinished Steel	56.80	56.80	56.80	56.80	52.10	40.60	36.00
Steelmaking Pig Iron	36.13	36.13	36.09	36.06	32.49	27.50	23.00
Steelmaking Scrap	37.83	37.83	37.83	39.00	32.48	19.17	19.17

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished material (except tin plate) and wire rods, cents per lb; coke, dollars per net ton; others, dollars per gross ton.

Finished Materials

	Sept. 27, 1947	Aug., 1947	June, 1947	Sept., 1946
Steel bars, Pittsburgh	2.90c	2.90c	2.60c	2.50c
Steel bars, Philadelphia	3.28	3.28	2.98	2.86
Steel bars, Chicago	2.90	2.90	2.50	2.50
Shapes, Pittsburgh	2.80	2.80	2.50	2.35
Shapes, Philadelphia	2.94	2.94	2.64	2.48
Shapes, Chicago	2.80	2.80	2.50	2.35
Plates, Pittsburgh	2.95	2.95	2.65	2.50
Plates, Philadelphia	3.15	3.15	2.85	2.558
Plates, Chicago	2.95	2.95	2.65	2.50
Sheets, hot-rolled, Pittsburgh	2.80	2.80	2.50	2.425
Sheets, cold-rolled, Pittsburgh	3.55	3.55	3.20	3.275
Sheets, No. 10 galv., Pittsburgh	3.90	3.90	3.55	†4.05
Sheets, hot-rolled, Gary	2.80	2.80	2.50	2.425
Sheets, cold-rolled, Gary	3.55	3.55	3.20	3.275
Sheets, No. 10 galv., Gary	3.90	3.90	3.55	†4.05
Strip, hot-rolled, Pittsburgh	2.80	2.80	2.50	2.45
Strip, cold-rolled, Pittsburgh	3.55	3.55	3.20	3.05
Bright basic, bess. wire, Pittsburgh	3.675	3.675	3.425	3.05
Wire nails, Pittsburgh	4.25	4.25	4.125	3.75
Tin plate, per base box, Pittsburgh	$5.75	$5.75	$5.75	*$5.25

* Nominal. † Base, No. 24 gage.

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$60.00	$60.00	$50.00	$38.00
Slabs, Pittsburgh, Chicago	47.50	47.50	42.00	39.00
Rerolling billets, Pittsburgh	47.50	47.50	42.00	39.00
Wire rod $\frac{5}{16}$ to $\frac{1}{4}$-inch, Pitts.	2.925c	2.925c	2.55c	‡2.30c

‡ Base, No. 5 to $\frac{5}{16}$-in.

Pig Iron

	Sept. 27, 1947	Aug., 1947	June, 1947	Sept., 1946
Bessemer, del. Pittsburgh	$37.83	$37.83	$34.83	$29.77
Basic, Valley	36.00	36.00	33.00	28.00
Basic, eastern del. Philadelphia	38.72	38.72	35.52	29.93
No. 2 fdry., del. Pgh. N. & S. sides	37.33	37.33	34.33	29.27
No. 2 fdry., del. Philadelphia	39.22	39.22	36.02	30.43
No. 2 foundry, Chicago	36.00	36.00	33.00	28.50
No. 2 foundry, Valley	36.50	36.50	33.50	28.50
Southern No. 2, Birmingham	34.88	34.51	29.88	24.88
Southern No. 2, del. Cincinnati	39.75	39.38	34.75	28.94
Malleable, Valley	36.50	36.50	33.50	28.50
Malleable, Chicago	36.50	36.50	33.50	28.50
Charcoal, low phos., fob Lyles, Tenn.	44.00	44.00	40.50	33.00
Ferromanganese, fob cars, Pittsburgh	140.25	140.25	140.25	140.00

Scrap

Heavy melt. steel, No. 1, Pittsburgh	$38.00	$39.875	$32.44	$20.00
Heavy melt. steel, No. 2, E. Pa.	36.75	38.35	33.38	18.75
Heavy melt. steel, No. 1, Chicago	38.75	39.625	30.75	18.75
Heavy melt. steel, No. 1, Valley	40.00	40.50	34.06	21.00
Heavy melt. steel, No. 1, Cleveland	38.25	38.81	32.38	19.50
Heavy melt. steel, No. 1, Buffalo	39.50	40.88	32.00	19.25
Rails for rerolling, Chicago	46.25	47.125	38.75	22.25
No. 1 cast, Chicago	43.50	43.50	39.50	23.75

Coke

Connellsville, beehive furnace	$12.00	$12.00	$9.56	$8.75
Connellsville, beehive foundry	14.50	14.50	10.75	9.50
Chicago, oven foundry, del.	18.50	18.50	16.10	15.10

FINISHED AND SEMIFINISHED IRON, STEEL PRODUCTS

Finished steel quoted in cents per pound and semifinished in dollars per gross ton, except as otherwise noted. Prices apply on an individual producer basis to products within the range of sizes, grades, finishes and specifications produced at its plants. Delivered prices do not include the 3 per cent federal tax on freight.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, price negotiated, fob mill. Forging quality $46, Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown.

Alloy Steel Ingots: Pittsburgh, $56.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $45-$50, sales by smaller interests on negotiated basis at $65 or higher.

Forging Quality, Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $55-$58; Detroit, del., $61; eastern Mich., $62.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $66, del. Detroit $69, eastern Mich., $70.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $60; sales by smaller interests on negotiated basis at $66 or higher.

Skelp: Pittsburgh, Sparrows Point, Youngstown, Coatesville, 2.60c-2.65c per lb.

Tube Rounds: Pittsburgh, Chicago, Gary, Cleveland, $69.

Wire Rods: Pittsburgh, Chicago, Birmingham, $\frac{7}{32}$ to $\frac{1}{4}$-in., inclusive $2.80-3.05 per 100 lb. Galveston base, $2.95. Worcester, 2.90c. San Francisco (base del.), $3.52.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3-in.: Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham, Duluth, base, 20 tons one size, 2.90c; Detroit, del., 3.05c; eastern Mich., 3.10c; New York, del., 3.31c; Phila., del., 3.28c; San Francisco (base, del), 3.63-3.95c; Los Angeles (base, del.), 3.625-3.86c; Seattle, 3.58c, base.

Rail Steel Bars: Same basing points as merchant carbon bars, except base is 10 tons. Prices upon application.

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 3.30c; Detroit, del., 3.45c; eastern Mich., 3.50c. (Texas Steel Co. uses Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lb., 3.55c; Detroit, del., 3.70c; Toledo, 3.75c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Canton, base, 4.10c; Detroit, del., 4.25c; eastern Mich., 4.30c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base, 2.75c; San Francisco (base, del.), 3.33c; Los Angeles (base, del), 3.325c; Seattle, 3.88c, base.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo, base price upon application.

Iron Bars: Single refined, Pittsburgh 7.15c-†7.70c; double refined, 8.00-†9.75c; Pittsburgh, staybolt, 8.85c-†11.25c.

† Hand puddled.

Sheets

Hot-Rolled Sheets (18 gage and heavier): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Ashland, Ky., base, 2.80c; Granite City, 3.175c; Detroit, del., 2.95c; eastern Mich., del., 3.00c; Philadelphia, del., 3.00c; New York, del., 3.09c; Los Angeles (base, del), 3.54c; San Francisco, (base, del.), 3.545c. (Andrews Steel Co. quotes Middletown, O., base for shipment to Detroit. Alan Wood Steel Co., Conshohocken, Pa., quotes 3.40c, Sparrows Point equivalent).

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.55c; Granite City, 3.65c; Detroit, del., 3.70c; eastern Mich., del., 3.75c; New York, del., 3.96c; Philadelphia, del., 3.93c.

Galvanized Sheets, No. 10: (Based on 5 cent zinc) Pittsburgh, Chicago, Gary, Birmingham, 3.85c-3.95c; Youngstown, Sparrows Point, Canton, Middletown, base, 3.95c; Granite City, 4.05c; New York, del., 4.24c; Philadelphia, del., 4.15c; Los Angeles (base, del.), 4.62c; San Francisco (base, del.), 4.625c.

Corrugated Galvanized Sheets, No. 10: (Based on 5 cent zinc) Pittsburgh, Chicago, Gary, Birmingham base, 3.95c-4.05c.

Culvert Sheets, No. 16 flat: (Based on 5 cent zinc; corrugated 10 cents extra) Pittsburgh, Chicago, Gary, Birmingham: Copper alloy, 4.45c-4.55c; copper-iron or pure iron, 4.80c-4.90c. Granite City 4.65c and 5.00c, respectively. Los Angeles (base, del.), 5.24c; San Francisco (base, del.) 5.245c.

Aluminized Sheets: Hot-dipped, coils or cut to lengths: Pittsburgh, 7.50c.

Long Ternes, No. 10: Pittsburgh, Chicago, Gary, base, 3.85c-4.05c.

Enameling Sheets, No. 12: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 3.90c-3.95c; Granite City, base, 4.05c; Detroit, del., 4.10c; eastern Mich., 4.15c.

Electrical Sheets, No. 24: Field: Pittsburgh, Chicago, Gary, 4.50c; Kokomo, Ind., 4.60c. Armature: Pittsburgh, Chicago, Gary, 4.80c; Granite City, Ill., Kokomo, Ind., 4.90c. Electrical: Pittsburgh, Chicago, Gary, 5.30c; Granite City, okomo, 5.40c. Motor: Pittsburgh, Chicago, Gary, 6.05c; Granite City, 6.15c. Dynamo: Pittsburgh, 6.75c; Granite City, 6.85c. Transformer 72, 7.25c; 65, 7.95c; 58, 8.65c; 52, 9.45c, Pittsburgh.

Strip

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Birmingham, Youngstown, base, 2.80c; Detroit, del., 2.95c; eastern Mich., del., 3.00c; San Francisco (base, del.), 3.605c; Los Angeles (base, del.), 3.60c.

Cold-Rolled Strip: 0.25 carbon and less: Pittsburgh, Cleveland, Youngstown, 3.55c; Chicago, base, 3.65c; Detroit, del. 3.70c; eastern Mich., 3.75c; Worcester, base, 3.75c-4.10c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland base: 0.26-0.40 carbon, 3.55c; over 0.40 to 0.60 carbon, 5.05c, over 0.60 to 0.80, 5.65c; over 0.80 to 1.00, 7.15c; over 1.00, 9.45c; add 0.20c for Worcester.

Tin, Terne, Plate

Tin Plate: Pittsburgh, Chicago, Gary, Warren, O., 100-lb base box, $5.75; Granite City, Birmingham, Sparrows Point, $5.85.

Electrolytic Tin Plate: Pittsburgh, Gary, Warren, O., 100-lb base box 0.25 lb tin, $4.85; 0.50 lb tin, $5.05; 0.75 lb tin, $5.25; Granite City, Birmingham, Sparrows Point, $4.95, $5.15, $5.35, respectively.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, Warren, O., base 29-gage and lighter, 3.90c; Granite City, Birmingham, Sparrows Point, 4.00c.

Manufacturing Ternes (Special Coated): Pittsburgh, Chicago, Gary, 100-lb base box $4.90; Granite City, Birmingham, Sparrows Point, $5.00.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb $14.10.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, 2.95c; Coatesville, Claymont, 3.15c; Geneva, Utah, 3.10c; New York, del. 3.24c; Phila., del., 3.15c; St. Louis, del., 2.77c; Boston, del., 3.38c; San Francisco and Los Angeles, del., 3.59c for sizes and grades produced at Geneva, 3.76c for sizes and grades produced at Fontana, Calif.

(Central Iron & Steel Co., Harrisburg, Pa., 4.15c, basing points.)

Floor Plates: Pittsburgh, Chicago, 4.20c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, 3.80c-4.137c; Coatesville, 4.50c.

Clad Steel Plates: Coatesville, 10% cladding: Nickel clad, 21.50c; inconel-clad, 30.00c; monel-clad, 29.00c.

Pittsburgh, Washington, Coatesville, Pa., 20% stainless-clad, base prices including annealing and pickling: No. 304, 24.00c; No. 410, 22.00c; No. 430, 22.50c; No. 446, 29.00c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.80c; New York, del., 3.00c; Phila., del., 2.94c; Geneva, Utah (base, del.), 2.975c; Los Angeles (base, del.), 3.44c-3.47c; Los Angeles and San Francisco, del., 3.44c for sizes produced at Geneva; San Francisco, del., 3.44c for sizes produced at Fontana, Calif.

Alloy Structural Shapes: Pittsburgh, Chicago, 3.55c.

Steel Piling: Pittsburgh, Chicago, Buffalo, $3.30 per 100 lb.

Wire and Wire Products

(Fob Pittsburgh, Chicago, Cleveland and Birmingham per 100 pounds).

Wire to Manufacturers in carloads

Bright, basic or bessemer *$3.55-3.80
Spring (except Birmingham) **$4.25-**4.50

Wire Products to Trade

Nails

Standard and cement-coated ..... †$4.25
Galvanized ..... ‡$4.00
Staples, polished and galvanized $4.25

Wire, Merchant Quality

Annealed (6 to 8 base) ..... §$4.20
Galvanized (6 to 8 base) ..... §§4.65

(Fob Pittsburgh, Chicago, Birmingham, per base column)

Woven fence, 15 gage and heavier .... ††91
Barbed wire, 80-rod spool ..... ††101
Barbless wire, twisted 101
Fence posts (no clamps) ..... ††90
Bale ties, single loop ..... ††91

* Worcester, $3.65, Duluth, $3.60, base. San Francisco (base, del) $4.56 for bright basic only.

** Worcester $4.60, Duluth and Trenton, N. J., $4.75, base. San Francisco (base, del.) $5.63 for MB spring wire; $5.28 black premier.

† Worcester $4.55, Cleveland $4.35, base. San Francisco (base, del.) $5.33.

‡ Duluth $4.00, Cleveland $4.10, base. San Francisco (base, del) $5.08.

§ Worcester $4.30, annealed; $4.75, galvanized. Duluth $4.20, annealed; $4.65, galvanized. San Francisco (base, del.) $5.21, annealed; $5.66, galvanized.

†† San Francisco (base, del.): Woven fence, 114; barbed wire, 121; bale ties, 115. Duluth (base): Woven fence, 91; barbed wire, 101; fence posts 90.

Rails, Supplies

Rails: Standard, over 60-lb fob mill, $2.75 per 100 lb. Light rails (billet), Pittsburgh, Birmingham, $3.10 per 100 lb; light rails (rail steel), Williamsport, Pa., Pittsburgh prices upon application.

Relaying, 60 lb and over fob warehouse $55-$56 per net ton.

Supplies: Track bolts, 7.00c; heat treated, 7.25c. Tie plates, $3.05 per 100 lb, fob mill; $3.40 base, Seattle; $3.20, base, Pittsburg, Calif. Splice bars, $3.25 per 100 lb, fob mill. Standard spikes, 4.00c-4.50c; screw spikes, 5.80c-6.40c. Axles, 4.10c.

Tubular Goods

Standard Steel Pipe: Base price in carlots, threaded and coupled, to consumers about $200 a net ton. Base discounts Pittsburgh on all types; Lorain on steel butt weld, and seamless; Gary, Ird., 2 points less on steel lap weld and 1 point less on steel butt weld on sizes produced in that district.

	Butt Weld				
In.	Blk.	Gal.	In.	Blk.	Gal.
⅛	46	19½	1	56	41½
¼	47	25	1¼	56½	42
⅜	44	22	1½	57	42½
½	50½	34½	2	57½	43
¾	53½	38½	2½ & 3...	58	43½

	Lap Weld		Elec. Weld		Seamless	
In.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
2 ...	49	34	48½	33½	48	33
2½-3	52	37	51½	36½	51	36
3½-6	54	39	53½	38½	53	38

Line Steel Pipe: Base price in carlots to consumers about $200 a net ton. Base discounts Pittsburgh and Lorain, O.

In.	Butt Weld	In.	Butt Weld
⅛	45	1	55
¼	46	1¼	55½
⅜	43	1½	56
½	49½	2	56½
¾	52½	2½ & 3	57

In.	Lap Weld	Elec. Weld	Seamless
2	48	47½	47
2½ & 3	51	50½	50
3½-6	53	52½	52
8	53½	53	52½
10	53	52½	52
12	52	51½	51

Boiler Tubes: Net base prices per 100 ft, fob Pittsburgh, in carload lots, minimum wall thickness, cut lengths 4 to 24 feet, inclusive.

		——Seamless——		—Elec. Weld—	
O.D. Sizes	B.W.G.	Hot Rolled	Cold Drawn	Hot Rolled	Cold Drawn
1"	13	....	$11.87	$11.51	$11.51
1¼" ..	13	....	14.06	11.48	13.64
1½" ..	13	$13.08	15.69	12.69	15.22
1¾" ..	13	14.88	17.85	14.43	17.31
2"	13	16.67	19.99	16.17	19.39
2¼" ..	13	18.58	22.29	18.02	21.62
2¼" ..	12	20.47	24.54	19.86	23.80
2½" ..	12	22.42	26.87	21.75	26.06
2¾" ..	12	23.76	28.48	23.05	27.63
3"	12	24.93	29.90	24.18	29.00
3¼" ..	11	29.03	34.81	28.16	33.77
3½" ..	11	31.17	37.39	30.23	36.27
4"	10	38.69	46.38	37.53	44.99
4½" ..	9	51.28	61.50	....	....
5"	9	59.39	71.18	....	....
6"	7	91.13	109.27	....	....

Pipe, Cast Iron: Class B, 6-in. and over $74.50 per net ton, Birmingham; $79.50, Burlington, N. J.; $85.06, del. Chicago; 4-in. pipe, $5 higher; class A pipe, $5 a ton over Class B. Prices effective as of July 24, 1947.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago; add 15c per cwt, Lebanon, Pa. Additional discounts: 5 for carloads; 15 for full containers, except tire, step and plow bolts.

Carriage and Machine Bolts

½-in. and smaller; up to 6 in. in length 43 off
⅜ and ⅝ x 6-in. and shorter ..... 50 off
Larger diameter; longer than 6 in..... 47 off

Tire bolts ..... 38 off
Step bolts ..... 46 off
Plow bolts ..... 57 off
Lag bolts
¼ in. up to 1 in., 6 in. and shorter. 50 off
¼ in. up to 1 in., longer than 6 in.. 48 off

Stove Bolts

In packages, nuts separate, 65-10 off; bulk 75 off on 15,000 of 3-in. and shorter, or 5000 over 3-in., nuts separate.

Nuts

Semifinished hexagon	A.S. Light	A.S. Reg. and Heavy
⅞-in. and smaller	51 off	.....
½-in. and smaller	.....	50 off
½-in.-1-in.	48 off	.....
⅝-in.-1-in.	.....	49 off
1⅛-in.-1½-in.	46 off	47 off
1⅝-in. and larger	.....	40 off

Additional discount of 15 for full containers.

Hexagon Cap Screws

Upset 1-in. smaller (10-20 bright)..... 56 off
Upset (10-35 heat treated)
⅝ x 6 ..... 51 off
¾, ⅞, & 1 x 6 ..... 47 off

Square Head Set Screws

Upset 1-in. and smaller ..... 61 off
Headless, ¼-in. and larger ..... 46 off
No. 10 and smaller ..... 56 off

Rivets

Fob Pittsburgh, Cleveland, Chicago Birmingham

Structural 5.25c
Lebanon, Pa. 5.40c
½-in. and under .....55-5 off
Lebanon, Pa. .....55-5 off plus 15c per cwt.

(Champion Rivet Co., Cleveland, quotes ½-in. diam. and larger rivets $5.65 per cwt and 7/16-in. diam. and smaller 55 per cent off list, effective Oct. 1.)

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl ..... $1.50-$2.00 off

Tool Steels

Tool Steel: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; reg. carbon 16.00-17.00c; extra carbon 20.00c; special carbon 24.00c; oil-hardening 26.00c; high carbon-chromium 47.00c.

W	Cr	V	Mo	Base, Per lb
18.00	4	1	...	82.00c
1.5	'	'	8.5	50.00c
12	3	0.50	...	67.00c
6.40	4.15	1.90	5	63.00c
5.50	4.50	4	4.50	80.00c

Stainless Steels

Base, Cents per lb

Grade	Bars, Drawn Wire, Structurals	Plate	Sheets	Hot Rolled Strip	Cold Rolled Strip
CHROMIUM NICKEL STEELS					
301	26.00c	29.50c	37.00c	22.00c	28.00c
302 ...	26.00	29.50	37.00	23.50	30.50
303 ...	28.50	31.50	39.00	29.50	36.00
304 ...	27.50	31.50	39.00	25.50	32.50
308 ...	31.50	37.00	44.50	31.00	38.00
309 ...	39.00	43.50	51.00	40.50	51.00
310 ...	53.50	56.50	57.50	53.00	61.00
316 ...	43.50	48.00	52.00	43.50	52.00
321 ...	31.50	37.00	44.50	32.00	41.50
347 ...	36.00	41.50	49.00	36.00	45.50
431 ...	21.00	24.00	31.50	19.00	24.50
440A ..	26.00	31.00	36.50	26.00	30.50
STRAIGHT CHROMIUM STEEL					
403 ...	23.50	27.00	32.00	23.00	29.50
410 ...	20.50	23.50	29.00	18.50	24.00
416 ...	21.00	24.00	29.50	20.00	25.50
420 ...	26.00	31.00	36.50	26.00	39.50
430 ...	21.00	24.00	31.50	19.00	24.50
430F ..	21.50	24.50	32.00	20.50	27.00
442 ...	24.50	28.00	35.50	26.00	35.00
443 ...	24.50	28.00	35.50	26.00	35.00
446 ...	30.00	33.00	39.50	38.00	56.50
*501 ..	9.00	13.00	17.50	13.00	18.50
*502 ..	10.00	14.50	18.50	14.50	19.50
†STAINLESS CLAD STEEL (20%)					
304 ...	....	24.00	22.00	....	....
410 ...	....	22.00	20.00	....	....
430 ...	....	22.50	20.50	....	....
446 ...	....	29.00	27.00	....	....

* Low chromium. † Fob Pittsburgh and Washington, Pa.; plate prices include annealing and pickling.

RAW MATERIAL AND FUEL PRICES

Minimum delivered prices do not include 3 per cent federal tax.

Pig Iron

Per Gross Ton	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$37.50	$37.00	$38.50	$38.00
Newark, N. J., del.	39.34	38.84	40.34	39.84
Brooklyn, N. Y., del.	40.50	....	....	41.00
Philadelphia, del.	39.22	38.72	40.22	39.72
Birdsboro, Pa., base	40.50	40.00	41.50	41.00
Birmingham, base	33.38*	32.88*	....	....
Baltimore, del.	39.78	....	....	....
Chicago, del.	37.12	....	....	....
Cincinnati, del.	38.25	....	37.75	....
Newark, N. J., del.	39.46	....	....	....
Philadelphia, del.	38.84	....	....	....
St. Louis, del.	37.37	....	36.87	....
Buffalo, base	*36.00	*36.00	37.00	*36.50
Boston, del.	42.48	42.48	43.48	42.98
Rochester, del.	37.84	37.84	38.84	38.34
Syracuse, del.	38.50	38.50	39.50	39.00
Canton, Massillon, O., base	36.00	35.50	....	36.50
Chicago, base	36.00	35.50	37.00	36.50
Milwaukee, del.	37.32	36.82	38.32	37.83
Muskegon, Mich., del.	39.83	....	....	40.33
Cleveland, fob furnace	*36.00	*35.50	37.00	*36.50
Akron, del.	37.67	37.17	38.67	38.17
Duluth, base	36.50	36.00	37.50	37.00
Erie, Pa., base	36.00	35.50	37.00	36.50
Everett, Mass., base	45.00	....	....	45.50
Granite City, Ill., base	37.00	36.50	....	37.00
St. Louis, del.	37.75	37.25	....	37.75
†**Neville Island, Pa., base**	36.50	36.00	37.00	36.50
Pittsburgh, del., N.&S. Sides	37.33	36.83	37.83	37.33
Provo, Utah, base	36.50	36.00	....	....
Seattle, Tacoma, Wash., del.	42.44	....	....	....
Portland, Oreg., del.	42.44	....	....	....
Sharpsville, Pa., base	36.50	36.00	37.00	36.50
Steelton, Pa., base	37.50	37.00	38.50	38.00
Struthers, O., base	37.00	36.50	37.50	37.00
Swedeland, Pa., base	41.50	41.00	42.50	42.00
Troy, N. Y., base	38.00	37.50	39.00	38.50
Toledo, O., base	36.00	35.50	37.00	36.50
Cincinnati, del.	39.50	39.00	....	....
Youngstown, O., base	36.50	36.00	37.00	36.50
Mansfield, O., del.	39.48	38.98	39.98	39.48

† To Neville Island base add: 66c for McKees Rocks, Pa., $1.01 Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 97c (water), Monongahela; $1.33 Oakmont, Verona; $1.49 Brackenridge.

* Republic Steel Corp., quotes $3 a ton higher at Birmingham, effective Aug. 13; $2.00 higher at Buffalo for No. 2 foundry and malleable and $1.50 higher for basic and $2.75 higher at Cleveland, effective on shipments during week ended Sept. 28.

Blast Furnace Silvery Pig Iron

6.00-6.50 per cent (base) $45.50
6.51-7.00..$46.75 9.01- 9.50. 53.00
7.01-7.50.. 48.00 9.51-10.00. 54.25
7.51-8.00.. 49.25 10.01-10.50. 55.50
8.01-8.50.. 50.50 10.51-11.00. 56.75
8.51-9.00.. 51.75 11.01-11.50. 58.00

Fob Jackson, O., per gross ton; Buffalo base $1.25 higher. Buyer may use whichever base is more favorable.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Electric Furnace Silvery Pig Iron: Si 14.01-14.50%, $72.50, Jackson, O.; $73.75, Niagara Falls; $78, piglets, $76, open-hearth and foundry grade, Keokuk, Iowa. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.5% Mn over 1%; $1 a ton for 0.045% max. phos.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. Fob furnace, Lyles, Tenn....$44.00 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $36.00

Low Phosphorus

Steelton, Pa., Buffalo, Troy, N. Y., $42.00; Birdsboro, Pa., $45 base; Philadelphia, $44.22, del. Intermediate phosphorus, Central furnace, Cleveland, $39.00.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge of 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge of 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Metallurgical Coke

Price per Net Ton

Beehive Ovens

Connellsville, furnace	$11.50-$12.50
Connellsville, foundry	14.00- 15.00
New River, foundry	12.50
Wise county, foundry	11.15
Wise county, furnace	10.65

Oven Foundry Coke

Kearney, N. J., ovens	$17.85
Chicago, outside del.	17.50
Chicago, del.	18.50
Terre Haute, del.	18.05
Milwaukee, ovens	18.25
New England, del.	19.50
Birmingham, del.	15.00
Indianapolis, ovens	17.00
Cincinnati, del.	16.50
Ironton, O., ovens	15.50
Painesville, ovens	16.60
Cleveland, del.	17.90
Buffalo, del.	18.25
Detroit, del.	17.65
Philadelphia, ovens	16.75
Swedeland, Pa., ovens	16.75
Portsmouth, O., ovens	16.00
Fairmont, W. Va., ovens	15.75
Pittsburgh, del.	17.61

Coal Chemicals

Spot, gal. freight allowed east of Omaha. Effective as of Apr. 1, 1947.

Pure and 90% benzol	19.00c
Toluol, two degrees	23.00c
Industrial xylol	23.00c
Solvent naphtha	26.00c

Per pound fob works

Phenol (car lots, returnable drums)	11.25c
Do., less than carlots	12.00c
Do., tank cars	10.25c

Eastern plants, per pound

Naphthalene flakes, balls, bbl, to jobbers, "house-hold use"	9.50c

Per ton, bulk, fob plants

Sulphate of ammonia	$30.00

Refractories

Per 1000, fob shipping point Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky.	$87.00

High Heat Duty

Pa., Ill., Md., Mo., Ky.	70.00
Ala., Ga.	70.00
N. J.	75.00

Intermediate Heat Duty

Ohio	64.00
Pa., Ill., Md., Mo., Ky.	64.00
Ala., Ga.	56.00
N. J.	67.00

Low-Heat Duty

Pa., Md., Ohio	56.00

Ladle Brick

(Pa., O., Va., Mo.)

Dry Press	47.00
Wire Cut	45.00

Malleable Bung Brick

All bases	80.00

Silica Brick

Pennsylvania	70.00
Joliet, E. Chicago	79.00
Birmingham, Ala.	70.00

Basic Brick

Net tons, fob Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	59.00
Chem. bonded chrome	59.00
Magnesite brick	81.00
Chem. bonded magnesite	70.00

Magnesite

Domestic dead-burned grains, net ton, fob Chewelah, Wash.

Bulk	24.00
Single bags	28.00

Dolomite

Domestic, dead-burned, bulk, net ton, fob Billmeyer, Blue Bell or Williams, Pa., Millville, W. Va., Narlo, Millersville, Martin, Gibsonburg or Woodville, O., $10.55; Midwest (fob Thornton or McCook, Ill.), add $0.10; Missouri Valley (fob Dolly Siding, Mo.), add $0.20.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$5.95
Old range nonbessemer	5.80
Mesabi bessemer	5.70
Mesabi nonbessemer	5.55
High phosphorus	5.55

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	15.25

Foreign Ore

Cents per unit, cif Atlantic ports

No. African low phos.	Nom.
Swedish basic, 60 to 68%	13.50
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% fob Rio de Janeiro, nom.	5.50-6.50

Tungsten Ore

Wolframite and scheelite per short ton unit, duty paid	$32–$34

Manganese Ore

46-50%, duty paid, fob cars, New York, Philadelphia, Baltimore, Norfolk, Va., Mobile, Ala., New Orleans, 63.00c-67.00c.

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Oreg., or Tacoma, Wash.

(S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$37.50
48% 3:1	39.00
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	$27-$27.50
45% no ratio	28.00
48% no ratio	30.00
50% no ratio	31.00
Brazilian—nominal	
44% 2.5:1 lump	$33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	$27-$27.50
48% no ratio	30.00
48% 3:1 lump	39.00
Domestic (seller's nearest rail)	
48% 3:1	$39.00

Molybdenum

Sulphide conc., lb., Mo. cont., Mines	$0.75

Fluorspar

Metallurgical grade, fob shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $33; 65% to 70%, $32; 60% to 65%, $31; less than 60%, $30.

HIGH-STRENGTH—LOW-ALLOY STEELS

Prices in dollars per 100 pounds

	Pittsburgh	Chicago	Gary	Youngstown	Sparrows Point	Buffalo	Bethlehem	Canton	Massillon
Sheets, Hot-Rolled	4.30	4.30	4.30	4.30	4.30	4.30	...	...	...
Cold-Rolled	5.30	5.30	5.30	5.30	...	5.30	...	...	...
Galvanized	5.85	...	...	...	...	...	...	...	...
Strip, Hot-Rolled	4.30	4.30	4.30	4.30	...	...	...	...	...
Cold-Rolled	5.30	5.30*	5.30*	5.30	...	...	...	...	...
Shapes, Structural	4.30	4.30	...	4.30	...	...	4.30	...	...
Plates	4.55	4.55	4.55	...	4.55	...	...	...	...
Bars, Small Shapes	4.45	4.45	4.45	4.45	...	4.45	...	4.45	4.45

*Nax High Tensile, produced by Great Lakes Steel Corp., quoted 10 cents higher.

WAREHOUSE STEEL PRICES

Prices, cents per pound, for delivery within switching limits, subject to extras.

	SHEETS					STRIP		BARS				PLATES	
	H-R 10G	C-R 10G	C-R 17G	Gal. *10G	Gal. *24G	†H-R	†C-R	H-R Rds. ⅜" to 3"	C-F Rds. ½"& up	H-R Alloy (8)4140)	Structural Shapes	Carbon ⅜"-¾"	Floor ¾" & Thicker
Boston (city)	4.90	5.97[4]	5.67[4]	6.10[4]	7.35[4]	4.97	6.71	4.92	5.57	7.17	4.77	5.05	6.72
††New York (city)	4.87	6.07	5.77[8]	6.07	7.32	4.97	....	4.97	5.52	6.97[9]	4.72	5.02	6.70
New York (country)	4.72	5.92	5.62[8]	5.92	7.17	4.82	....	4.82	....	....	4.57	4.87	6.55
Philadelphia (city)	4.64	6.23[9]	5.83[9]	5.84	7.09	4.73	5.63	4.78	5.48	6.92[9]	4.52	4.79	6.13
Philadelphia (country)	4.54	6.13[9]	5.73[9]	....	....	4.63	5.53	4.68	....	6.82[9]	4.42	4.69	6.03
Baltimore (city)	4.29†	5.85[8]†	5.55[8]†	5.54	6.79	4.70	....	4.75	5.45	....	4.64	4.74	6.20
Baltimore (country)	4.19†	5.75[8]†	5.45[8]†	5.35	6.60	4.60	....	4.65	....	....	4.54	4.64	6.10
Washington (city)	4.75	....	....	....	....	4.95	....	5.00	5.60[12]	....	4.90	4.95	6.60
Washington (country)	4.65	....	....	....	....	4.85	....	4.90	....	....	4.80	4.85	6.50
Norfolk, Va.	4.75	....	....	....	....	....	....	5.05	5.85	....	5.00	5.00	6.75
Memphis, Tenn. (city)	4.82§§	....	5.88	6.37	....	5.02	....	4.97	5.98	....	4.97	5.17	6.88
Memphis, Tenn. (country)	4.72§§	....	5.78	6.27	....	4.92	....	4.87	5.88	....	4.87	5.07	6.78
Buffalo (city)	4.45	....	5.20[8]	5.95	....	4.65	5.60	4.40	5.10	8.15	4.40	4.85	6.20
Buffalo (country)	4.30	....	5.05[8]	5.50	....	4.20	5.45	4.25	4.95	8.15	4.25	4.40	5.75
Pittsburgh (city)	4.25§§	....	5.10[3]†	5.65	6.90	4.35	5.35	4.40	5.10	10.65	4.40	4.60	5.90
Pittsburgh (country)	4.15§§	....	4.90[3]†	5.50	6.75	4.20	5.20	4.25	4.95	10.50	4.25	4.45	5.75
Cleveland (city)	4.45	5.50[8]	5.20[8]	5.638	6.888	4.488	5.35	4.40	5.10	6.908	4.611	4.55	6.111
Cleveland (country)	4.30	5.35[8]	5.05[8]	....	....	....	5.20	4.25	4.95	....	....	4.40	....
Cincinnati (city)	4.671	5.516[8]	....	5.716	6.466	4.694	....	4.703	5.353	....	4.744	4.903	6.244
Chicago (city)	4.45	5.50[8]	5.20[8]	5.65	6.90	4.35	5.35	4.40	5.10	6.65[12]	4.40	4.60	6.05
Chicago (country)	4.30	5.35[8]	5.05[8]	5.50	6.75	4.20	5.20	4.25	4.95	8.15	4.25	4.40	5.75
Milwaukee	4.599	5.649[8]	5.349[8]	5.799	7.049	4.499	5.599	4.549	5.249	6.949[9]	4.549	4.749	6.199
St. Louis	4.749	5.799[9]	5.499[5]	5.974	7.224	4.649	5.774	4.699	5.424[12]	7.124	4.699	4.899	6.349
Birmingham (city)	4.45[20]§§	....	....	5.80	....	4.45[20]	....	4.40[20]	5.93[22]	....	4.40	4.65	6.86
Birmingham (country)	4.30[20]§§	....	....	5.50	....	4.30[20]	....	4.25[20]	....	....	4.25	4.50	....
New Orleans	4.98[20]**	....	6.29[18]	....	....	5.18[20]	....	5.13[20]**	6.29[11]	....	5.03[20]**	5.33[20]	7.29[20]
Omaha, Nebr.	5.068	....	....	6.468	7.718	5.168	....	5.218	5.918	....	5.218	5.418	6.868
Seattle, Tacoma, Wash.	5.30[17]	....	7.10[8]	6.70	....	5.60[17]	....	5.30[17]	7.45[10]	8.50[13]	5.25[17]	5.45	7.55[17]

Base Quantities: 400 to 1999 lb except as noted: Cold-rolled strip, 2000 lb and over, cold finished bars, 1000 lb and over; galvanized sheets, 450 to 1499 lb; [1]—any quantity; [2]—300 to 1999 lb; [3]—150 to 2249 lb; [4]—three to 24 bundles; [5]—450 to 1499 lb; [6]—one bundle to 1499 lb; [7]—one to nine bundles; [8]—400 to 1499 lb; [9]—1000 to 1999 lb; [10]—450 to 39,999 lb; [11]—1000 to 39,999 lb; [12]—1000 lb and over; [13]—400 to 14,999 lb; [14]—400 to 39,999; [15]—2000 lb and over; [16]—1000 to 4999 lb; [17]—300 to 9999 lb; [18]—1500 to 1999 lb; [19]—1500 to 39,999 lb; [20]—400 to 3999 lb; [21]—400 lb and over; [22]—500 to 1499 lb.

* Include gage and coating extra, except Birmingham (coating extra excluded); † does not include gage extras; ‡ 15 gage; § as rolled, except Indianapolis, Los Angeles, San Francisco, and Pittsburgh where price represents annealed bars; ** add 0.46 for sizes not rolled in Birmingham; †† same prices quoted for Jersey City, N. J.; ‡‡ add 15c for 100 lb for slow moving items; §§ 18 gage and heavier.

PRICES OF LEADING FERROALLOYS PRODUCTS

Spiegeleisen: 19-21% Mn, 1-3% Si, carlot per gross ton, $47, Palmerton, Pa., $51, Pittsburgh. 16% to 19% Mn., $46, Palmerton, $50, Pittsburgh.

Ferromanganese, standard: 78-82% c.l. gross ton, duty paid, $135 fob cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer, Birmingham, Ala. (where Sloss-Sheffield Steel & Iron Co. is producer); $140.25 fob cars, Pittsburgh, including 75c switching charge, (where Carnegie - Illinois Steel Corp. is producer); add $8 for packed c.l., $15 for ton, $22 for less ton; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%.

Ferromanganese, low carbon: Eastern zone: Special, 21c; regular, 20.50c; medium, 14.50c; central zone: Special, 21.30c; regular, 20.80c; medium, 14.80c; western zone: Special, 21.30c; regular, 21.20c; medium, 15.20c. Prices are per pound contained Mn, bulk carlot shipments, fob shipping point, freight allowed. Special low-carbon has content of 90% Mn, 0.10% C, and 0.06% P.

Ferromanganese Briquets: (Weight approx. 3 lb and containing exactly 2 lb Mn). Prices per lb of briquets: Contract, bulk, carlots, 7.00c, packed, carlots, 7.60c, ton lots, 8.00c, smaller lots 8.40c, eastern, freight allowed; 7.25c, 7.85c, 8.60c and 9.00c, central; 7.80c, 8.40c, 10.50c and 10.90c, western; spot up 0.25c; notched, up 0.25c.

Ferrotungsten: Spot, 10,000 lb or more, per lb contained W, $2.32; contract, $2.50; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb contained Ti; ton lots $1.23; smaller lots $1.25; eastern. Spot up 5c per lb.

Ferrotitanium: 20-25%, 0.10 maximum C; per lb contained Ti; ton lots $1.35; smaller lots $1.40 eastern. Spot up 5c per lb.

Ferrotitanium, High - Carbon: 15-20% contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C, $142.50; 3-5% C, $157.50.

Ferrovanadium: V 0.35-0.55%, contract basis, per lb contained V, fob producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Ferromolybdenum: 55-75% per lb, contained Mo, fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% P content with unitage of $3 for each 1% of P above or below the base; gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Contract, lump, packed; eastern zone quotations: 90-95% c.l. 13.80c, ton lots 14.30c, smaller lots 14.80c; 75%, c.l. 11.05c, ton lots 11.65c, smaller lots 12.25c; 50%, c.l. 9.00c, ton lots 9.65c, smaller lots 10.30c. Deduct 1.00c for bulk, carlots, 80-90% and 90-95%; 1.05c, 75%; 1.20c, 50%. Prices are fob shipping point, freight allowed, per lb of contained Si.

Ferroboron: (B 17.50% max. and C 1.50% max., Al 0.50% max. and C 0.50% max.) Prices per lb of alloy, contract, ton lots $1.20, smaller lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Ferrocolumbium: 50-60%, per lb contained columbium in gross ton lots, contract basis, R.R. freight allowed, eastern zone, $2.50; smaller lots $2.55. Spot up 10c.

Ferrochrome: Contract, lump, packed; **high carbon,** eastern zone, c.l. 16.20c, ton lots 16.80c; central zone, add 0.40c and 1.30c; western zone, add 0.55c and 2.10c. Deduct 0.60c for bulk carlots. **High carbon, high nitrogen,** add 5c to all high carbon ferrochrome prices. Deduct 0.55c for bulk carlots. **Low carbon,** eastern zone, bulk, c.l., max. 0.06% C 23c; 0.1% 22.50c, 0.15% 22.00c, 0.2% 21.75c; 0.5% 21.50c, 1% 21.00c, 2% 20.50c; add 1.35c for 2000 lb to c.l.; central zone, add 0.4c for bulk, c.l.; and 0.65c for 2000 lb to c.l.; western zone, add 0.5c for bulk, c.l.; and 1.85c for 2000 lb to c.l.; carlot packed differential 0.80c. Prices are per lb of contained Cr, freight allowed.

Low carbon, high nitrogen: Add 2c to low carbon ferrochrome prices. For higher nitrogen low carbon, add 2c for each 0.25% of nitrogen over 0.75%.

Ferrochrome, Special Foundry: (Cr 62-66%, C above 5-7%.) Contract, 2-inch x D, packed, eastern zone, freight allowed, c.l. 17.05c, ton lots 17.60c, smaller lots 18.30c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.60c for bulk carlots.

S. M. Ferrochrome, high carbon: (Cr 60-65%, Si, Mn and C 4-6% each.) Contract, lump, packed, eastern zone, freight allowed, c.l. 17.30c, ton lots 17.90c, smaller lots 18.60c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Prices are per pound of contained chromium.

S. M. Ferrochrome, low carbon: (Cr 62-66%, Si 4-6%, Mn 4-6% and C 1.25% max.) Contract, carlot, bulk 21.00c; packed carlot 21.80c, ton lots 22.35c, smaller lots 23.35c, eastern, freight allowed, per pound of contained Cr; 21.40c, 22.20c, 23.00c, and 24.00c, central; 21.50c, 22.30c, 24.20c and 25.20c, western.

Ferrochrome Briquets: Containing exactly 2 lb Cr, packed eastern zone, c.l. 10.35c, ton lots 10.75c, smaller lots 11.15c; central zone, add 0.25c for c.l. and 0.90c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.50c for bulk carlots. Prices per pound of briquets; notched 0.25c higher.

Chromium Metal: 97% min. Cr, max. 0.50% C, eastern zone, per lb contained Cr bulk, c.l. 79.50c, 2000 lb to c.l. 80c; central 81c and 82.60c; western 82.25c and 84.75c, fob shipping point, freight allowed.

Chromium-Copper: (Cr 8-11%, Cu 88-90%, Fe 1% max., Si 0.50% max.) Contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Calcium metal, cast: Contract, ton lot or more, $1.60; 100 to 1999 lb, $1.95; less than 100 lb, $3.15 per lb of metal, eastern zone; $1.615, $1.965 and $3.185, western; spot up 5c.

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%), per lb of alloy. Contract, carlots, packed, 16.10c, ton lots 17.60c, smaller lots 18.60c, eastern, freight

allowed; 16.60c, 18.45c, 19.45c, central; 18.65c, 20.20c, 21.20c, western; spot up 0.25c.

Calcium - Silicon: (Ca 30-35%, Si 60-65% and Fe 3.00% max.), per lb of alloy. Contract, lump, packed, carlots 14.60c, ton lots 16.10c, smaller lots 17.10c, eastern, freight allowed; 15.10c, 16.85c, 17.85c, central; 17.15c, 19.00c, 20.00c, western; spot up 0.25c.

Silicon Metal: Min. 97% Si and max. 1% Fe, eastern zone, bulk, c.l. 14.50c; 2000 lb to c.l. 16.00c; central zone, 15.10c and 18.25c; western, 15.70c and 20.00c; min. 96% Si and max. 2% Fe, eastern, bulk, c.l., 14.10c; 2000 lb to c.l. 15.60c; central, 14.70c and 17.85c; western, 15.30c and 19.60c, fob shipping point, freight allowed. Price per lb contained Si.

Silicomanganese Briquets: Containing exactly 2 lb Mn and about ½ lb Si, eastern zone, bulk, c.l. 6.75c, ton lots 7.75c; central zone, add 0.25c for c.l. and 0.60c for ton lots; western, add 0.80c for c.l. and 2.50c for ton lots. Notched, up 0.25c.

Silicon Briquets: Weighing about 5 lb and containing exactly 2 lb Si, packed, eastern zone, c.l. 4.70c, ton lots 5.10c, smaller lots 5.50c; weighing about 2½ lb and containing 1 lb Si, packed, eastern zone, c.l. 4.85c, ton lots 5.25c, smaller lots 5.65c; notched 0.25c higher; central zone, add 0.25c for c.l. and 0.60c for smaller lots; western zone, add 0.45c for c.l. and 0.90c for smaller lots. Prices are fob shipping point, freight allowed. Deduct 0.50c for bulk carlots.

Manganese Metal: (Min. 96% Mn., max. 2% Fe), per lb of metal, eastern zone, bulk, c.l. 30c, 2000 lb to c.l., 32.00c; central 31.00c and 33.45c; western, 31.45c and 34.40c.

Electrolytic Manganese: 99.9% plus, fob Knoxville, Tenn., freight allowed east of Mississippi on 250 lb or more: Carlots 32c, ton lots 34c, drum lots 36c, less than drum lot 38c. Add 1½c for hydrogen-removed metal.

Manganese-Boron: (Mn 75% approx., B 15-20%, Fe 5% max., Si 1.50% max. and C 3% max.) Prices per lb of alloy. Contract, ton lots $1.89, less $2.01, eastern, freight allowed; $1.903 and $2.023, central; $1.935 and $2.055, western; spot up 5c.

Nickel-Boron: (B 15-18%, Al 1% max., Si 1.50% max., C 0.50% max., Fe 3% max., Ni, balance). Prices per lb of alloy: Contract, 5 tons or more $1.90, 1 ton to 5 tons $2.00, smaller lots $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Borosil: 3 to 4% B, 40 to 45% Si; $6.25 per lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: B 1.5-1.9%, ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: B 0.90 to 1.15% net ton to carload, 8c per lb, fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%) Prices per lb of alloy, contract, or spot carlots 35.00c, ton lots 37.00c, smaller lots 39.00c, eastern, freight allowed; 35.30c, 38.10c and 40.10c, central; 35.30c, 40.05c and 42.05c, western; spot up 0.25c.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7% and Fe approx. 20%) Price per lb of alloy, contract, carlots 13.50c, ton lots 14.25c, smaller lots 15.00c, eastern zone, freight allowed; 13.80c, 15.35c, 16.10c, central; 13.80c, 17.30c, 18.05c, western.

CMSZ Alloys 4 & 5: (Alloy 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3.00-4.50%; alloy 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.00%, Zr 0.75-1.25%, C 3.50-5.00%). Prices per lb of alloy, contract, bulk, carlots 14.50c; packed carlots 15.25c, ton lots 16.00c, smaller lots 16.75c, eastern, freight allowed; 14.80c, 15.55c, 17.10c, 17.85c, central; 14.80c, 15.55c, 19.05c, 19.80c, western.

Zirconium alloy: 12-15%, per lb of alloy, eastern, contract, bulk, carlots 5.50c, packed, carlots 6.05c, ton lots 6.40c, smaller lots 6.75c.

Zirconium alloy: Z 35-40%, eastern, contract, packed, carlots 17.00c, ton lots 17.75c, smaller lots 19.00c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe) Contract basis fob Niagara Falls, N. Y., lump per lb carlots 6.50c; ton lots packed, 7.00c; 200 to 1999 lb, 7.75c; smaller lots, 8.25c. Spot up ½c.

Simanal: (Approx. 20% each Si, Mn, Al) Packed, lump, carload 9c, ton lots 9.25c, smaller lots 9.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Tungsten Metal Powder: Spot, not less than 98.8%, $3.05, freight allowed as far west as St. Louis.

Grainal: Vanadium Grainal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

Vanadium Pentoxide, technical grade: Fused, approx. 89-92% V_2O_5 and 5.84% Na_2O; or air dried, 83-85% V_2O_5 and 5.15% Na_2O, $1.10 per lb contained V_2O_5 fob plant; freight allowed on quantities of 25 lb and over to St. Louis.

New Premium Price Plan for Metals Sought

Western miners of copper, lead and zinc propose plan for stimulating development work

NEW YORK—Western producers of major nonferrous metals recommend resumption of the premium price plan in a modified form for exploratory and development work with government aid. This proposal was made at a recent hearing in Seattle held by the House Small Business Committee.

While all major metal markets held steady last week scattered changes were posted in some of the others.

COPPER—There were 96,484 tons of new refined copper contained in products shipped during August from brass mills, wire mills and other users of the metal. This represents an increase of 9317 tons over the 87,167 tons of copper contained in July shipments.

Unfilled orders on books of copper and brass product makers totaled 425,620 tons at the end of August against 434,120 tons at the end of July, a decrease of 8500 tons.

Volume of new business booked in August totaled 87,984 tons compared with 71,810 tons during July, gain of 6174 tons.

Due to a decline in demands for all types of copper castings, shipments dropped 17 per cent in July to 70,603,000 tons compared with 84,604,000 pounds in June, according to the Bureau of the Census. During July, 1946, shipments totaled 79,379,000 tons. Shipments for the first seven months of 1947, totaling 632,387,000 pounds, were still 8 per cent higher than the 587,717,000 pounds shipped in the like 1946 period. At the end of July, the volume of unfilled orders, amounting to 70,002,000 pounds, represented a backlog of two months at the current rate of shipments. This compared with an order backlog of 67,119,000 pounds at the end of June and 82,815,000 pounds at the end of July, 1946.

Only routine business was transacted in the domestic market at the steady price level of 21.50c, delivered Connecticut, for electrolytic.

BRASS AND BRONZE INGOTS—A leading producer of brass and bronze ingots reduced prices ½-cent on the red ingot groups and ¾-cent on the yellow brass and manganese bronze groups, effective as of Sept. 18. The reduction was attributed to an easier price situation in red metal scrap. The market is now quoted as follows in carlots: 85-5-5-5 (No. 115), 17.50c to 18.00c; 80-10-10 (No. 305), 21.50c to 22.00c; 88-10-2 (No. 215), 25.75c to 26.25c; and yellow ingot (No. 405), 13.75c to 14.50c; and manganese bronze (No. 421), 15.75c to 16.50c.

LEAD—Demand for lead for delivery in October was active last week with sellers encountering no difficulty in disposing of daily quotas. Bookings for delivery next month cover nearly 90 per cent of estimated needs and indicate that shipments during that period will probably show an improvement over those for the month just ending. All urgent needs are being covered, although some consumers would like to receive larger tonnages in order to replenish inventories. Prices remained steady at 14.80c to 14.85c, East St. Louis.

Shipments of lead and lead-base alloy die castings eased slightly in July to 1,013,000 pounds from 1,079,000 pounds in June, according to the Bureau of the Census. In July, 1946, they totaled 987,000 pounds. Unfilled orders at the end of July rose to 595,000 pounds, an increase of about 100,000 pounds. This, however, is less than one-half the backlog at the end of July, 1946, when it stood at 1,353,000 pounds.

ZINC—Bunker Hill & Sullivan Mining Co., Wallace, Idaho, is preparing to mine and mill a large tonnage of low-grade zinc-lead-silver ore, involving an estimated 5 million tons. The area to be block caved is in the old workings where the high grade ore has been removed.

Shipments of zinc and zinc-base alloy castings declined 8 per cent in July to 31,313,000 pounds from 33,890,000 in June, according to the Bureau of the Census. This compared with 30,015,000 pounds in July, 1946. Total shipments for the first seven months came to 266,099,000 pounds, representing an increase of 33 per cent over the 199,550,000 pounds delivered in the like 1946 period. At the end of July, unfilled orders on the books of foundries totaled 104,142,000 pounds, equal to about four months operations. The order backlog amounted to 116,020,000 at the end of June and 135,039,000 at the end of July, 1946.

TIN—Little activity was noted in the tin market last week, prices holding firm at 80.00c, New York, for Straits.

Exports of tin ore and concentrates from Bolivia were the equivalent of 2569 metric tons of fine tin in July, making a total of 18,194 tons for the first seven months of this year compared with 21,542 tons in the 1946 period.

SILVER—Handy & Harman's official price rose to 71.37½c, New York, last week, an increase of ⅞-cent for the period. Strength in the market was attributed to scarcity of spot supplies. Annual inventory taking at one important refinery added temporarily to the tight supply situation. Demand from the silverware makers and other industrial users continued large.

PLATINUM—A leading refiner of platinum reduced the price of this metal $2 an ounce last week to the basis of $62 an ounce, wholesale; $65, retail. Weakness was due to a falling off in demand.

NONFERROUS METAL PRICES

Copper: Electrolytic, carlots 21.50c, delivered Conn.; Lake, 21.62½c, del. Conn. Dealers may add ¾c for 5000 lb to carload; 1c, 1000-4999 lb; 1½c, 500-999 lb; 2c, 0-499 lb. Casting, nom., refinery, 20,000 lb or more; nom., less than 20,000 lb.

Brass Ingot: 85-5-5-5 (No. 115) 17.50c-18.00c; 88-10-2 (No. 215) 25.75-26.25c; 80-10-10 (No. 305) 21.50-22.00c; No. 1 yellow (No. 405) 13.75-14.50c; carlot prices, including 25c per 100 lb freight allowance; add ¼c for less than carloads.

Zinc: Prime western 10.50c, brass special 10.75c, intermediate 11.00c, E. St. Louis; high grade 11.50c, del., carlots. For 20,000 lb to carlots add 0.15c; 10,000-20,000 lb 0.25c; 2000-10,000 lb 0.4c; under 2000 lb 0.50c.

Lead: Common 14.80c-14.85c, chemical 14.90c, corroding 14.90c, E. St. Louis for carlots.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lb and over; add ½c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 type) 14.00-14.50c; No. 12 foundry alloy (No. 2 grade) 13.75c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-97½%) 14.50c; grade 2 (92-95%) 12.75c; grade 3 (90-92%) 12.00-12.25c; grade 4 (85-90%) 11.50-11.75c. Above prices for 30,000 lb or more; add ¼c 10,000-30,000 lb; ½c 5000-10,000 lb; ¾c 1000-5000 lb; 1¼c less than 1000 lb. Prices include freight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, about 20 lb), 10,000 lb and over, 20.50c; 2000 to 9999 lb, 21.50c; 100 to 1999 lb, 22.50c. Extruded rounds, 12 inches long, 1.312 inches in diameter, less than 25 lb, 52.00c-56.00c; 25 to 99 lb, 42.00c-46.00c; 100 to 4000 lb, 35.00c-36.00c.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lb, 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 80.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05% max. arsenic, 79.85c; Grade C, 99.65-99.79% incl. 79.55c; Grade D, 99.50-99.64% incl., 79.40c; Grade E, 99-99.49% incl. 78.90c; Grade F, below 99% (for tin content), 78.70c.

Antimony: American bulk carlots fob Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 33.00c; 99.8% and over (arsenic, 0.05% max.; other impurities, 0.1% max.) 33.50c, effective as of Mar. 15. On producers' sales add ¼c for less than carload to 10,000 lb; ½c for 224-9999 lb; add 2c for 223 lb and less; on sales by dealers, distributors, and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked 35.00c lb; 25 lb pigs produced from electrolytic cathodes 36.50c lb; shot produced from electrolytic cathodes 37.50c lb; "F" nickel shots or ingots for additions to cast iron 35.50c lb. Prices include import duty.

Mercury: Open market, spot, New York, $81-$84 per 76-lb flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be, $17 per lb contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms $1.75 lb, del.; anodes, balls, discs and all other special or patented shapes, $1.80.

Cobalt: 97-98%, $1.65 lb for 550 lb (keg); $1.67 lb for 100 lb (case); $1.72 lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Indium: 99.9%, $2.25 per troy ounce.

Silver: Open market, N. Y., 71.37½c, per ounce.

Platinum: $62-$65 per ounce.

Palladium: $24 per troy ounce.

Iridium: $80-$90 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass products prices based on 21.50c, Conn., for copper. Freight prepaid on 100 lb or more.)

Sheet: Copper 33.68c; yellow brass 29.63c; commercial bronze, 95% 33.72c, 90% 33.11c, red brass, 85% 31.99c, 80% 31.38c; best quality 30.64c; Everdur, Duronze, Herculoy or equiv., cold-drawn, 38.46c; nickel silver, 18%, 42.49c; phosphor bronze, grade A, 5%, 52.00c.

Rods: Copper, hot rolled 30.03c, cold drawn 31.03c; yellow brass, free cutting, 24.39c; commercial bronze, 95% 33.41c, 90% 32.80c; red brass, 85% 31.68c, 80% 31.07c; best quality 30.33c.

Seamless Tubing: Copper 33.72c; yellow brass 32.39c; commercial bronze 90% 35.52c; red brass 85% 34.65c, 80% 34.04c; best quality brass 33.05c.

Wire: Yellow brass 29.92c; commercial bronze, 95% 34.01c, 90% 33.40c; red brass, 85% 32.28c, 80% 31.67c; best quality brass 30.93c.

Copper Wire: Bare, soft, fob eastern mills, carlots 27.72c, less carlots 28.22c; weatherproof, fob eastern mills carlots 28.12c, less carlots 28.62c; magnet, delivered, carlots 29.75c-31.13c, 15,000 lb or more 30.00c-31.38c, less carlots 30.50c-31.88c.

Aluminum Sheets and Circles: 2s and 3s flats, mill finish, base 30,000 lb or more, fob shipping point. Actual transportation charges (not to exceed lowest carload rail freight rate) are deducted on orders for domestic delivery of 500 lb or more of one product to one destination. Widths from 12 in. and diameters from 9 in. to indicated maximum sizes. Prices, cents per lb, effective Jan. 30, 1947.

B. & S. Gage	Max. Width or Diam.	Sheet Base	Circle Base
0.0249"-7	48"	23.70	26.20
8-10	48"	24.20	26.70
11-12	26"	24.70	27.50
13-14	26"	24.90	27.90
15-16	26"	25.10	28.20
17-18	26"	25.40	28.60
19-20	24"	25.70	29.00
21-22	24"	26.10	29.50
23-24	24"	26.60	30.20
25	24"	27.10	30.90
26	24"	27.80	31.90
27	24"	28.50	33.00
28	24"	29.20	33.70
29	24"	30.00	34.70
30	24"	30.80	35.80

Lead Products: Prices to jobbers: Sheets, full rolls, 140 sq ft or more, 18.25c; add per hundredweight, 25c, 80 to 140 sq ft; 50c, 20 to 80 sq. ft; 75c, 10 to 20 sq ft and circles. Pipe: Full coils 17.50c; cut coils 17.75c. Lead Traps and Bends: List plus 42%.

Zinc Products: Sheet, 15.50c, fob mill, 36,000 lb and over. Ribbon zinc in coils, 14.50c, fob mill, 36,000 lb and over. Plates, not over 12-in., 13.50c; over 12-in., 14.50c.

Plating Materials

Chromic Acid: 99.75%, flake, fob Philadelphia, carloads, 21.00c; 5 tons and over 21.50c; 1 to 5 tons, 22.00c; less than 1 ton, 22.50c.

Copper Anodes: Base, 2000 to 5000 lb; fob shipping point, freight allowed: Flat untrimmed, 30.59c; oval, 30.09c; electrodeposited, 29.84c; cast, 29.59c.

Copper Carbonate: 52-54% metallic Cu, 50 lb bags, 26.50c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 45.00c fob Cleveland.

Sodium Cyanide: 96-98%, ½-oz ball, in 100 or 200 lb drums, 1 to 400 lb, 16.00c, 500 lb and over, 15.00c, fob Cleveland; 1 cent less, fob Niagara Falls.

Nickel Anodes: Rolled oval, carbonized, carloads, 48.00c; 10,000 to 30,000 lb, 49.00c; 3000 to 10,000 lb, 50.00c; 500 to 3000 lb, 51.00c; 100 to 500 lb, 53.00c; under 100 lb, 56.00c; add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 22.00c; 275-lb bbls, 20.00c.

Tin Anodes: Bar, 1000 lb and over 92.50c; 500 to 1000 lb, 93.00c; 200 to 500 lb, 93.50c; less than 200 lb. 95.00c; ball, 1000 lb and over, 94.75c; 500 to 1000 lb, 95.25c; 200 to 500 lb. 95.75c; less than 200 lb, 97.25c, fob Sewaren, N. J.

Tin Chloride: Fob Grasselli, N. J., 625 lb bbls., price on application.

Sodium Stannate: To all consumers; in 200 or 500 lb drums, 49.50c; 100 lb, 50.50c; 50 lb, 55.00c; 25 lb, 57.50c.
To consumers other than automobile, radio and refrigerator makers: 1500 lb, 45.85c; 600 to 1400 lb, 48.50c.
To automobile, radio and refrigerator makers: 10,000 lb and over, 44.50c; 2000 to 9999 lb. 45.50c; 1000 to 1999, 46.50c; 600 to 999 lb, 48.50c.

Zinc Cyanide: 100-lb drums 36.00c, fob Cleveland; 35.00c, fob Niagara Falls.

Scrap Metals

BRASS MILL ALLOWANCES

(Based on 21.50c, Conn., for copper)
Prices for less than 15,000 lb fob shipping point. Add ¾c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	19.125	19.125	18.375
Yellow brass	15.125	14.875	14.250
Commercial Bronze			
95%	18.000	17.750	17.250
90%	17.500	17.250	16.750
Red brass			
85%	17.250	17.000	16.500
80%	16.875	16.625	16.125
Best Quality (71-79%)	16.125	15.875	15.375
Muntz Metal	14.125	13.875	13.375
Nickel silver, 5%	16.125	15.875	8.063
Phos. bronze, A, B	20.000	19.750	18.750
Naval brass	14.500	14.250	13.750
Manganese bronze	14.500	14.250	13.625

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, fob shipping point, carload lots)

No. 1 copper 17.00, No. 2 copper 16.00, light copper 15.00, composition red brass 13.00-13.50, auto radiators 9.75-10.00, heavy yellow brass 9.00-9.50, brass pipe 9.75-10.25.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 18.25-18.50, No. 2 copper 17.00, light copper, 16.00, refinery brass (60% copper), per dry copper content less $5 smelting charge for brass analyzing 60 per cent or more, 13.125.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire No. 1 16.00, No. 2 15.00-15.25, light copper 14.00, No. 1 composition red brass 11.00-11.50, No. 1 composition turnings 10.50-11.00, mixed brass turnings 6.00-6.50, new brass clippings nom. 10.50-11.00, No. 1 brass rod turnings 9.00-9.50, light brass 5.50-6.00, heavy yellow brass 6.50-7.00, new brass rod ends 9.00-9.50, auto radiators, unsweated 8.50-9.00, cocks and faucets 8.00-8.50, brass pipe 8.00.

Lead: Heavy 11.50, battery plates 6.50-6.75, linotype and stereotype 12.25-12.50, electrotype 10.75-11.00, mixed babbitt 10.75-11.00, solder joints 15.50-16.00.

Zinc: Old zinc 5.00, new die cast scrap 3.50-4.00, old die cast scrap 2.00-2.50.

Tin: No. 1 pewter 50.00-52.00, block tin pipe 67.00-68.00, auto babbitt 40.00-42.00, No. 1 babbitt 40.00-43.00, siphon tops 40.00-42.00.

Aluminum: Clippings, 2S 8.00-8.50, old sheets 6.00-6.50, crankcases 6.00-6.50, borings and turnings 2.00-2.50, pistons, free of struts, 5.00-5.50.

Nickel: Anodes 16.00-17.00, turnings 12.50-13.00, rod ends 16.00-17.00.

Monel: Clippings 12.00-12.50, turnings 7.00-7.25, old sheets 10.00-10.50, rods 10.00-10.50, castings 9.00.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

PITTSBURGH

No. 1 Heavy Melt. Steel	$38.00
No. 2 Heavy Melt. Steel	38.00
No. 1 Busheling	38.00
Nos. 1, 2 and 3 Bundles	38.00
Machine Shop Turnings	32.50-33.00
Mixed Borings, Turnings	32.50-33.00
Short Shovel Turnings.	34.50-35.00
Cast Iron Borings	34.50-35.00
Bar Crops and Plate	45.50-46.00
Low Phos. Steel	44.50-45.00
Punchings & Plate Scrap	44.50-45.00
Cut Structurals	44.50-45.50
Elec. Furnace Bundles.	43.50-44.50
Heavy Turnings	36.50-37.50

Cast Iron Grades

No. 1 Cupola	43.00-43.50
Charging Box Cast	40.00-40.50
Heavy Breakable Cast.	36.50-37.50
Stove Plate	34.50-35.50
Unstripped Motor Blocks	38.00-39.00
Malleable	49.50-50.50
Brake Shoes	35.00-36.00
Clean Auto Cast	40.00-41.00
No. 1 Wheels	42.00-42.50
Burnt Cast	32.00-33.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	41.50-42.00
R.R. Malleable	50.00-51.00
Axles	42.00-43.00
Rails, Rerolling	44.00-45.00
Rails, Random Lengths	43.00-44.00
Rails, 3 ft and under	46.00-47.00
Rails, 18 in. and under	47.00-48.00
Railroad Specialties	47.50-48.00
Uncut Tires	46.00-46.50
Angles, Splice Bars	45.00-46.00

CLEVELAND

No. 1 Heavy Melt. Steel	$38.00-38.50
No. 2 Heavy Melt. Steel	38.00-38.50
No. 1 Busheling	38.00-38.50
Nos. 1 & 2 Bundles	38.00-38.50
Machine Shop Turnings	33.00-33.50
Mixed Borings, Turnings	33.50-34.00
Short Shovel Turnings.	33.50-34.00
Cast Iron Borings	33.50-34.00
Bar Crops and Plate	41.00-41.50
Punchings & Plate Scrap	41.00-41.50
Heavy Turnings	37.00-37.50
Alloy Free Turnings	34.00-34.50
Cut Structurals	41.00-44.00

Cast Iron Grades

No. 1 Cupola	46.50-47.50
Charging Box Cast	43.50-44.50
Stove Plate	43.00-43.50
Heavy Breakable Cast.	41.00
Unstripped Motor Blocks	41.00
Malleable	57.00-60.00
Brake Shoes	42.00
Clean Auto Cast	48.00-50.00
No. 1 Wheels	44.00
Burnt Cast	41.00-41.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	41.00-41.50
R.R. Malleable	57.00-60.00
Rails, Rerolling	50.00
Rails, Random Lengths	46.00-47.00
Rails, 3 ft and under	48.00-50.00
Cast Steel	48.00-48.50
Railroad Specialties	48.00-48.50
Uncut Tires	43.00-43.50
Angles, Splice Bars	48.00-50.00

VALLEY

No. 1 Heavy Melt. Steel	$39.00-41.00
No. 2 Heavy Melt. Steel	38.00-40.00
No. 1 Bundles	38.00-40.00
Machine Shop Turnings	34.00-35.00
Short Shovel Turnings.	34.00-35.00
Cast Iron Borings	34.00-35.00
Low Phos.	44.00-45.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	40.50-41.00

MANSFIELD

No. 1 Heavy Melt. Steel	$38.00-40.00
Machine Shop Turnings	35.00
Short Shovel Turnings.	36.00-37.00

CINCINNATI

No. 1 Heavy Melt. Steel	$37.00
No. 2 Heavy Melt. Steel	37.00
No. 1 Busheling	37.00
No. 1 Bundles	37.00
No. 2 Bundles	37.00
Machine Shop Turnings	31.00
Mixed Borings, Turnings	30.00
Short Shovel Turnings.	33.00
Cast Iron Borings	32.00

Cast Iron Grades

No. 1 Cupola Cast	47.00
Charging Box Cast	41.00
Heavy Breakable Cast.	40.00
Stove Plate	38.00
Unstripped Motor Blocks	38.00
Brake Shoes	35.00
Clean Auto Cast	46.00
Drop Broken Cast	50.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	40.00
R.R. Malleable	57.00
Rails, Rerolling	46.00
Rails, Random Lengths	44.00
Rails, 18 in. and under	50.00

DETROIT

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$34.50-35.00
No. 1 Busheling	34.50-35.00
Nos. 1 & 2 Bundles	34.50-35.00
No. 3 Bundles	34.50-35.00
Machine Shop Turnings	27.50-28.00
Mixed Borings, Turnings	27.50-28.00
Short Shovel Turnings.	28.50-29.00
Cast Iron Borings	28.50-29.00
Punchings & Plate Scrap	39.50-40.00

Cast Iron Grades

No. 1 Cupola Cast	39.00-40.00
Heavy Breakable Cast.	33.00-34.00
Clean Auto Cast	39.00-40.00

BUFFALO

No. 1 Heavy Melt. Steel	$39.00-40.00
No. 2 Heavy Melt. Steel	37.00-38.00
No. 1 Busheling	37.00-38.00
No. 1 & 2 Bundles	37.00-38.00
Machine Shop Turnings	29.50-30.50
Mixed Borings, Turnings	29.50-30.50
Cast Iron Borings	29.50-30.50
Short Shovel Turnings.	30.50-31.50
Low Phos	42.00-43.00
Elec. Furnace Bundles.	39.50-40.50

Cast Iron Grades

No. 1 Cupola Cast	40.00-41.00
Heavy Breakable Cast.	35.00-36.00
Malleable	48.00-50.00
No. 1 Wheels	41.00-42.00

Railroad Scrap

Rails, 3 ft and under	45.00-46.00
Railroad Specialties	46.00-47.00

PHILADELPHIA

No. 1 Heavy Melt. Steel	$36.50-37.00
No. 2 Heavy Melt. Steel	36.50-37.00
No. 1 Busheling	36.50-37.00
No. 1 Bundles	36.50-37.00
No. 2 Bundles	36.50-37.00
No. 3 Bundles	34.50-35.00
Machine Shop Turnings	29.50-30.50
Mixed Borings, Turnings	29.50-30.50
Short Shovel Turnings.	30.50-31.50
Bar Crop and Plate	41.50-42.50
Punchings & Plate Scrap	41.50-42.50
Cut Structurals	41.50-42.50
Elec. Furnace Bundles.	40.50-41.00
Heavy Turnings	39.00-40.00
No. 1 Chemical Borings	35.00-37.00

Cast Iron Grades

No. 1 Cupola Cast	46.00-48.00
Charging Box Cast	46.00-47.00
Heavy Breakable Cast.	46.00-47.00
Unstripped Motor Blocks	40.50-41.50
Malleable	57.00-58.00
Clean Auto Cast	47.00-48.00
No. 1 Wheels	46.50-47.50

NEW YORK

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$32.00
No. 2 Heavy Melt. Steel	32.00
No. 1 Busheling	32.00
Nos. 1 & 2 Bundles	32.00
No. 3 Bundles	31.00
Machine Shop Turnings	25.50-26.00
Mixed Borings, Turnings	27.00-27.50
Short Shovel Turnings.	27.00
Punchings & Plate Scrap	34.00-35.00
Cut Structurals	34.00-35.00
Elec. Furnace Bundles.	33.00
No. 1 Chemical Borings	24.50-25.00

Cast Iron Grades

No. 1 Cupola Cast	40.00
Charging Box Cast	38.00-38.50
Heavy Breakable	38.00-38.50
Unstripped Motor Blocks	36.00-37.00
Malleable	54.00-55.00

BOSTON

(Fob shipping point)

No. 1 Heavy Melt. Steel	$31.00-32.00
No. 2 Heavy Melt. Steel	31.00-32.00
Nos. 1 & 2 Bundles	31.00-32.00
No. 1 Busheling	31.00-32.00
Machine Shop Turnings	24.50-25.50
Mixed Borings, Turnings	26.00-26.50
Short Shovel Turnings.	26.50-27.50
Bar Crops and Plate	33.00-34.00
Punchings & Plate Scrap	33.00-34.00
Chemical Borings	27.00-28.00

Cast Iron Grades

No. 1 Cupola Cast	42.00-44.00
Charging Box Cast	38.00-39.00
Heavy Breakable Cast.	38.00-39.00
Stove Plate	37.00-38.00
Unstripped Motor Blocks	35.00-36.00
Clean Auto Cast	40.00-42.00

CHICAGO

No. 1 Heavy Melt. Steel	$38.50-39.00
No. 2 Heavy Melt. Steel	38.50-39.00
Nos. 1 & 2 Bundles	38.50-39.00
No. 3 Bundles	36.50-37.00
Machine Shop Turnings	33.50-34.00
Mixed Borings, Turnings	33.50-34.00
Short Shovel Turnings.	35.50-36.00
Cast Iron Borings	34.50-35.00
Bar Crops and Plate	41.00-41.50
Cast Steel	41.00-41.50
Punchings	41.00-41.50
Elec. Furnace Bundles.	39.50-40.00
Heavy Turnings	38.00-38.50
Cut Structurals	41.50-42.00

Cast Iron Grades

No. 1 Cupola Cast	42.00-45.00
Malleable	42.00-45.00
Clean Auto Cast	42.00-45.00
No. 1 Wheels	42.00-45.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	40.00-40.50
Rails, Rerolling	46.00-46.50
Rails, Random Lengths	41.50-42.00
Rails, 3 ft and under.	44.00-44.50
Rails, 18 in. and under	44.50-45.00
Railroad Specialties	43.00-43.50
Angles, Splice Bars	43.00-43.50

ST. LOUIS

No. 1 Heavy Melt. Steel	$39.50-40.50
No. 2 Heavy Melt. Steel	38.50-39.50
Machine Shop Turnings	32.00-33.00
Short Shovel Turnings.	34.00-35.00

Cast Iron Grades (Fob shipping point)

No. 1 Cupola Cast	42.00-43.00
Charging Box Cast	39.00-40.00
Heavy Breakable Cast.	35.00-36.00
Brake Shoes	37.00-38.00
Clean Auto Cast	42.00-43.00
Burnt Cast	35.00-37.00

Railroad Scrap

R.R. Malleable	54.00-55.00
Rails, Rerolling	45.00-46.00
Rails, Random Lengths	42.00-43.00
Rails, 3 ft and under	45.00-46.00
Uncut Tires	43.50-44.50
Angles, Splice Bars	43.00-44.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$34.00-35.00
No. 2 Heavy Melt. Steel	34.00-35.00
No. 1 Busheling	34.00-35.00
Nos. 1 & 2 Bundles	34.00-35.00
No. 3 Bundles	31.00
Long Turnings	24.50
Short Shovel Turnings.	26.00-27.00
Cast Iron Borings	25.00
Bar Crops and Plate	38.50
Cut Structurals	38.50

Cast Iron Grades

No. 1 Cupola Cast	41.00
Stove Plate	39.00
No. 1 Wheels	36.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	37.00
R.R. Malleable	42.50
Axles, Steel	39.00
Rails, Rerolling	41.00
Rails, Random Length.	39.00
Rails, 3 ft and under	41.00
Angles and Splice Bars.	41.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	*$22.00
No. 2 Heavy Melt. Steel	*22.00
No. 1 Busheling	*22.00
Nos. 1 & 2 Bundles	*22.00
No. 3 Bundles	*17.00
Machine Shop Turnings	*12.50
Bar Crops and Plate	22.00
Cast Steel	22.00
Alloy Free Turnings	12.50
Cut Structurals	22.00
Tin Can Bundles	17.00

Railroad Scrap

Axles	29.00
Rails, Random Lengths	23.50
Uncut Tires	30.50

* Fob California shipping point.

SEATTLE

No. 1 Heavy Melt. Steel	$22.00
No. 2 Heavy Melt. Steel	22.00
No. 1 Busheling	22.00
Nos. 1 & 2 Bundles	22.00
No. 3 Bundles	20.00
Machine Shop Turnings	13.50
Mixed Borings, Turnings	13.50
Punchings & Plate Scrap	23.50
Cut Structurals	23.50

Cast Iron Grades

No. 1 Cupola Cast	27.50
Charging Box Cast	22.50
Heavy Breakable Cast.	21.50
Stove Plate	23.00
Unstripped Motor Blocks	21.50
Malleable	27.50
Brake Shoes	27.50
Clean Auto Cast	27.50
No. 1 Wheels	24.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Railroad Malleable	27.50
Rails, Random Lengths	20.00
Angles and Splice Bars	21.50

LOS ANGELES

No. 1 Heavy Melt. Steel	$22.50
No. 2 Heavy Melt. Steel	22.50
Nos. 1 & 2 Bundles	22.50
Machine Shop Turnings	16.00
Mixed Borings, Turnings	15.50-16.00
Punchings & Plate Scrap	28.00
Elec. Furnace Bundles.	28.00

Cast Iron Grades

No. 1 Cupola Cast	35.00-36.00

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THE NATION NEEDS YOUR SHEET SCRAP!

In mills, industrial plants and scrap yards, **LOGEMANN SCRAP PRESSES** are working day and night to prepare sheet scrap for the furnaces.

Sheet mills particularly recognize the value of the years of experience and the performance records which back up LOGEMANN designs and workmanship.

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The scrap press illustrated operates in one of the largest industrial plants. Compresses scrap from three directions to produce high-density mill size bundles. Built in various capacities.

Sheets, Strip . . .

Carryover into fourth quarter to be heavy in all grades except stainless

Sheet Prices, Page 130

New York — Sheet sellers this week are carrying over into the new quarter possibly the heaviest arrearages since the end of the war, except in major strike periods last year. Some will have more than two months production to work off before they can start on their new quotas, with arrearages in general averaging more than six weeks production on the major grades.

The only betterment as compared with three months ago appears to be in silicon and stainless sheets. The latter has been in easy supply throughout the greater part of the year and while only recently there has been some improvement in demand it has not been enough to bring volume up to the level prevailing at the beginning of the current quarter. Silicon sheets are still in strong demand, but facilities have been expanded somewhat and in general the situation has eased slightly, with indications that this trend will continue over the remainder of the year.

Boston — While some narrow cold strip producers are booking business for first quarter, outlook for hot-rolled strip is clouded with uncertainty. Production is hampered by lack of balance in inventories and hot-strip allocations will be continued in the first quarter. Cold strip producers who had hoped to drop allotments starting with the new year are forced to continue quotas and on this basis schedules are already filling on some items. The number of mills supplying hot strip has dwindled. Especially tight are low carbon grades. Demand has stepped up this quarter and incoming volume is heavier than shipments with backlogs again rising; inroads on backlogs during the third quarter due to a slackening in buying were not up to expectations due to the lack of hot-rolled material.

Philadelphia—Sheet carryover into the fourth quarter will be heavier than at the beginning of the current period and in all probability the heaviest since the end of the war. Some producers, in fact, have revised their quotas to such an extent that they will have less than a month's production of new tonnage to offer their customers over the remainder of the year. This applies in general to hot and cold rolled sheets, and galvanized and enameling stock. Other producers are in somewhat better position on these products, but on the average will have less than six weeks' production to apply against new quotas. The overall situation in electrical sheets and certain other specialties is not as tight, and in stainless not nearly as tight. Most producers of this latter product can supply as much as consumers require.

Pittsburgh—Cooler weather is expected to make possible an increase in sheet and strip production pace through remainder of this year. However, it is improbable much headway can be made against substantial carryover tonnage without reducing customers' future monthly allotments. Supply is not expected to be in balance with demand until well into 1948 at earliest, despite fact additional cold-reduction mill capacity will be brought into service in the interim. This increased capacity will be offset in part by related speed-up programs on some finishing mill units and extensive blast furnace relining programs.

Chicago — Despite the fact that steelmaking in this district holds at high level—94 per cent currently—sheet and stripmakers are unable to dent their tremendous backlogs. Demand seems stronger than ever and consumers are pressing constantly for faster deliveries and increased quotas. Considerable interest also is being displayed over quotas to be established for first and second quarters of 1948. From all appearances, yearend carryover tonnage will force lower quotas, although mills are hopeful that something will happen to forestall cuts. At any rate, it will be some time before 1948 quotas are announced.

Cleveland — Sheet and strip sellers here are carrying over a large volume of unfilled business into the fourth quarter. In an effort to bring order books up to a current basis by the yearend, some sellers are reducing quotas for the period by approximately one-third and will apply October production to arrearages. Consumers will receive as much tonnage, if not more, in the final three months of the year as they did in the quarter just ending. All types of flat-rolled products, including enameling and electrical sheets, are in heavy demand with potential buying in excess of mills' capacity.

Cincinnati—Sheet mills are facing demands, emergency in nature, which developed from damage done in Florida and elsewhere by the recent hurricane. Mill interests indicated they are obliged to divert some tonnage, not yet determined, to meet desperate requirements. Hence, an already tight supply situation may be still tighter. Mills were unable to lop off much of the carryover during the third quarter despite a high level of operations.

Birmingham — Although probably not on an extensive scale, as yet, substitution of aluminum for some specifications of still critically short sheets is reported here. The trend is definite and marked in roofing, with the aluminum product reported as having gained widespread approval. Hot-rolled sheets remain especially tight. Most items are said to be even scarcer than during the war.

Rails, Cars . . .

Track Material Prices, Page 131

New York — The New York Central, which soon will be receiving initial deliveries on 5000 new box cars, is now taking bids on 3000 self-clearing hopper cars, with 1000 for the account of its affiliated railroad, Pittsburgh & Lake Erie. A leading car award involves 500 hopper cars and 300 box cars for the St. Louis-San Francisco, to Pullman-Standard.

New York Central will close bids on 1948 rail requirements, plus splice bars, Oct. 1. While tonnage involved has not been announced, this railroad last year closed on 110,000 net tons of rails for 1947.

Steel Bars . . .

Railroad equipment and machine tool builders active in bar market

Bar Prices, Page 130

Boston — Although there are exceptions in sizes and grades, bar users are better off as to steel supply than most consumers of carbon steel products. Alloy and cold finished bars, in most sizes, are in balance with demand, also more ranges in hot-rolled carbon. There is slight improvement in flats, but a tigntening in hot-rolled rounds, three inch and over. Latter were among the first to ease some months back in the hot-rolled carbon category. Secondary bar distributors have improved their position as regards old bar orders and, in line with more consumers, are placing orders on a replacement-demand basis.

New York — Continued easing in cold-drawn carbon bar demand is expected to result eventually in a freer supply of hot-rolled bars. However, to date there has been no appreciable improvement in supply of hot bars, with fourth quarter quotas, in fact, no larger than for the period now ending. The continued stringency in hot-rolled bars may be accounted for in part by better demand for large rounds. Throughout the greater part of this year demand for these larger sizes has been off; however, the past several weeks have witnessed better buying from railroads and railroad equipment builders and machine tool builders.

Philadelphia—Hot carbon bar producers, with few exceptions, have set up quotas for the fourth quarter which are about on the same scale as for the current period. They will all have carryovers, but not much, if any, larger than they had last July. Whether the easing in cold-drawn carbon bar demand will be reflected much before the end of the year in hot carbon bar supply still remains a question. Alloy bar specifications continue to lag, with deliveries available wihtin a few weeks on both the hot or cold grades.

Cleveland — Carryover of unfilled business in carbon bars from the third quarter will be moderate, being chiefly in small sizes. Quotas for the final three months of the year will show little change from those for the period just ending. Demand continues pressing, especially from warehouses which still have small and poorly balanced inventories. Supply of alloy bars is fairly good with deliveries available in comparatively short time.

Tin Plate . . .

Tin Plate Prices, Page 131

Pittsburgh—Prospect of increased tin plate output next year is said to be dependent on extent, if any, that pig tin allocations are increased and amount of steel available for cold-reduction tin mill rolling schedules. A number of programs are under way aimed at speeding up electrolytic lines, while additional primary steel and finishing mill capacity is scheduled for completion next year.

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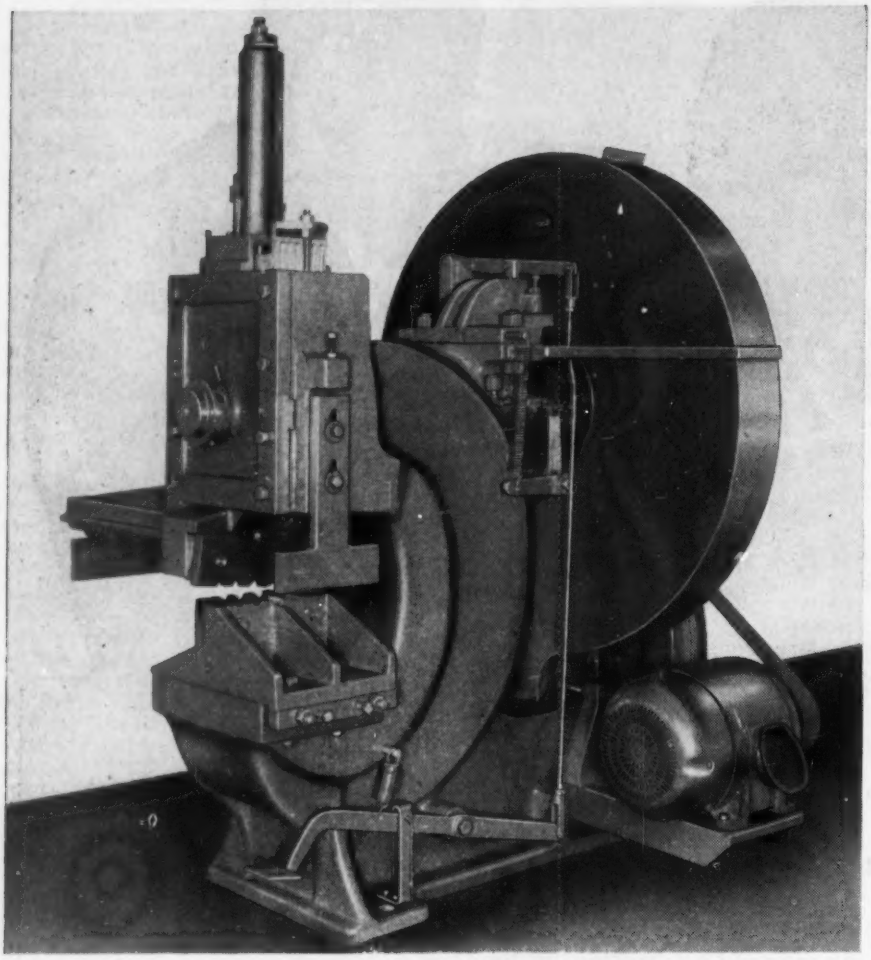

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Plates . . .

Plate Prices, Page 131

New York — Plate buying here is featured by the placing of 20,300 tons of tank work by the Texas Co. for installation at Deptford, N. J. Of this amount 16,300 tons for 80 tanks will be fabricated by the Bethlehem Steel Co., Bethlehem, Pa., and 4000 tons for 6 tanks by the Hammond Iron Works, Warren, Pa. Tank work otherwise is rather quiet, except for continued active demand for small underground fuel oil storage tanks. Despite the lateness of the season, considerable amount of this work is still being done. Major difficulty is shortage of the light gage plate required.

Except where producers are in position to do much of the fabricated work involved, most mills have little or nothing to offer in the way of plates in any gage for delivery over the remainder of this year. While one or two producers are fairly caught up on back orders, most of them are entering the new quarter with substantial arrearages, which are cutting into quotas for the new period. Some mills are accepting tonnage for shipment beyond the first of the year, but are taking only the more attractive tonnages, others have not as yet opened their books for 1948, preferring first to wait until they can better gage how much carryover they will have on hand at the end of the year.

Boston — With the possible exception of sheets, distribution of plates is accompanied with the most confusion in all steel products. Added to this are price-cost factors confronting plate fabricators. The latter at the moment is secondary to ability to acquire tonnage, but eventually will be given more consideration than now. Bulk of carbon plates is reaching New England on a 2.95c Sparrows Point base, but some tonnage is not, while the price range for extra-carrying quality grades is broad. At no time since reconversion started have carbon plates been as tight as now and prospects for any improvement in fourth quarter are dubious.

Birmingham — Demand for plates is unabated. While the district's car plant has been fairly well supplied, needs are keeping pace with supplies and even exceeding available tonnage. Result is an additional tonnage is moving from time to time into the district.

Structural Shapes . . .

Structural Shape Prices, Page 131

Boston — Fabricated structural tonnage for bridges is below normal and expectations. Connecticut is taking the bulk of material in New England this year, but even that state is behind schedule on its highway program. Current inquiry covers only small bridges requiring a minimum of fabrication. Plain material supply is limited and the acquisition of fill-in lots to round out shop requirements, notably in smaller sizes, is increasingly difficult. This is delaying some work under contract. Inquiry is slack, but new contracts cover 650 tons for a garage in New Haven, Conn.

New York — While private work is tapering, public demand for structurals is improving. At present several sizable public projects are active,

some of which have been mentioned in previous issues as contemplated.

Philadelphia — Structural demand continues fairly active, with bids just closed on 1800 tons for the Hazelton, Pa., Industrial Development Corp. and with other outstanding work including 1600 tons for hangars for the Philadelphia Southwest airport, bids due Oct. 8, and 1400 tons for the Auto Light Co., Philadelphia. A leading award involves 500 tons for the Hershey Chocolate Co., Hershey, Pa.

Seattle — Fabricators report average operations. No large awards were reported last week, although two local plants are booking about 200 tons each weekly in small contracts, each running from 20 to 50 tons. On some larger jobs, shops cannot bid because of material shortages or uncertain mill deliveries. Allocations are still inadequate and plants see no immediate relief.

Wire . . .

Wire Prices, Page 131

Pittsburgh—There are no signs of any easing in the very tight supply situation for manufacturers' wire items, and jobbers' inventories of nearly all merchant wire products continue unbalanced and well below normal. A slightly lower production schedule on nails is reported, reflecting failure of housing program to reach projected unit construction. Monthly output of nails is currently between 60,000 and 65,000 tons, in contrast to 70,000-ton monthly rate earlier this year. Wire rope demand is fairly well sustained although below that recorded last spring. There still continues the tendency among producers to shy away from specialty wire commitments and production emphasis appears to be on plain wire requiring a minimum amount of handling and processing.

Boston—Demand for wire is heavier, but fixed allocations on most products and full schedules operate against increased tonnage for consumers. Incoming volume is generally ahead of shipments and backlogs on many items are not being materially reduced. Large users, including automotive, are again pressing for wire. Consumers of low carbon are worse off for material than users of high carbon, with most producers favoring the latter in production schedules. Supply of heading wire is below demand and most screw manufacturers are still out of inventory balance. Call for stapling wire is heavy. While there are a few exceptions, including music wire, fourth quarter schedules are filled. Tempered goods are extended into next year.

Chicago — For most wire products, manufacturers' as well as merchant, demand is in excess of production. Items which are particularly tight in the merchant classification are woven wire fencing, barbed wire and posts.

Birmingham — One of the district's largest wire jobbers reports marked scarcity in all wire products continues. Baling wire has been especially scarce, along with fencing and manufacturers' wire. Neither producers nor jobbers will venture any

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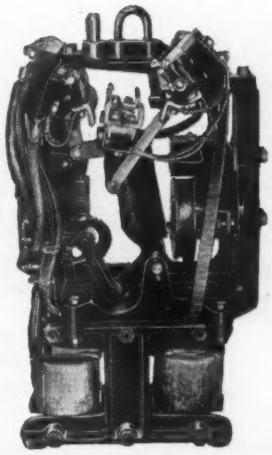

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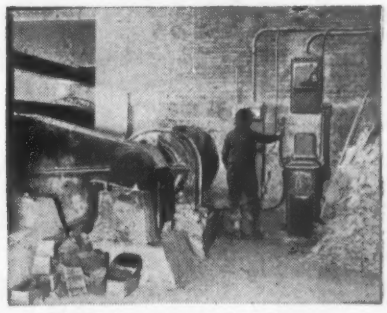

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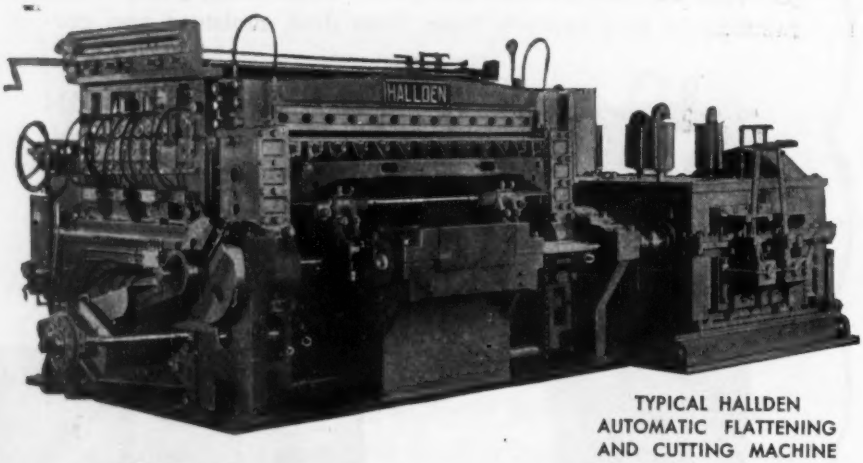

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promise of worthwhile relief, at least not in the foreseeable future.

St. Louis — Bethlehem Steel Co., Bethlehem, Pa., has a contract for 450 tons, 7/16-inch, seven-wire, extra-high-strength plain-steel strand, minimum breaking strength 20,800 pounds, delivered fob Greenville, Miss. This is a U. S. Engineer, Vicksburg, award.

Tubular Goods . . .

Tubular Goods Prices, Page 131

Boston—Wrought iron pipe allocations, while below heavy demand, are usually filled on better schedule than steel pipe quotas and there are some openings for direct shipments. Additional water services are the backbone of wrought pipe volume, two-in. and under. Paper mills also account for substantial wrought pipe volume. Merchant steel pipe schedules for first quarter are being assembled provisionally, with some direct shipments under quotas due utilities. In some cases, however, these allocations will be divided into quarters, whereas utilities want lump deliveries. With one producer closing out on light-walled electric tubing at the end of this year, consumers generally have been able to arrange new sources. Demand for steel pipe by the textile mill equipment industry holds up well.

Seattle — Plans for ten major pipe replacement projects, estimated to cost $295,000, have been completed here but shortage of cast iron pipe is delaying construction. These jobs involve replacement of wood mains with cast iron of larger sizes. No pipe placed in 1947 has yet been delivered and a contract dated April, 1946, has been only partially filled and no delivery yet made on an award made in July, 1946. Pipe en route by water has recently been held back by maritime labor troubles. The Seattle water department has approximately $646,000 of pipe on order, still undelivered, of which $346,000 is for local improvement district projects.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 131

Pittsburgh—Effective Oct. 1, leading producers of bolts and nuts are putting into effect a new list of discounts which will result in a price increase of about 6 per cent on bolts and 9 per cent on nuts. Average increase, it is understood, amounts to about 8 per cent. An important move in connection with the advance is the announcement that hereafter prices ruling on deliveries will be those quoted at time of shipment. Heretofore, firm prices were quoted on a quarterly basis.

Cleveland — Deliveries of steel to fastener producers have shown some improvement recently, inventories being at generally satisfactory working levels in all but the smallest sizes which remain in short supply. Some tightness is expected to develop in other sizes as the result of the recent curtailment of operations in the Pittsburgh area. Effects of this steel loss have not yet been generally felt in the fastener industry, however.

Some price revisions in bolts and

nuts will be made effective Oct. 1. A recent change by a large rivet manufacturer, to become effective Oct. 1, raises structural rivets 40 cents to $5.65 per cwt and decreases the discount on small rivets to 55 per cent.

Warehouse . . .

Warehouse Prices, Page 133

New York — Heavy demand for hot-rolled carbon products, including flat-rolled, plates, structurals, merchant pipe and wire goods, finds distributors with unbalanced, inadequate stocks to meet the load. Substantial part of this strong pressure for warehouse steel is due to inability of users to get all tonnage wanted or needed from mills. Held to allotments, numerous consumers turn to warehouses for additional steel and many large individual orders or inquiries would normally go direct to mills. To this extent, the high level of warehouse demand is fictitious, but this will continue until primary producers are caught up with mill-buyer requirements. Of the hot-rolled carbon products, only bars are approaching this point.

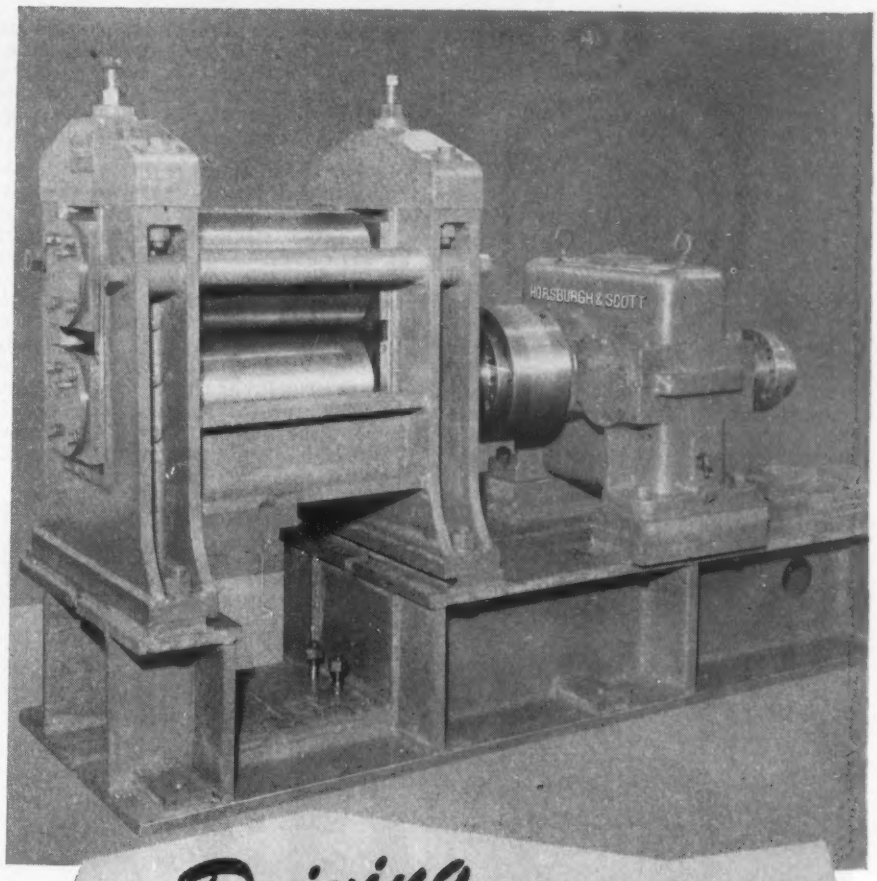
Pittsburgh — Distributors' stock position on plates, sheets, pipe, merchant wire items, and structurals continues nearly depleted despite slight improvement in mill deliveries recently. Unprecedented heavy demand for these items makes it impossible for warehouse interests to retain balanced inventories or to even closely approach essential customers' requirements. Supply of alloys, most stainless products, tool steels and cold-finished bars are only items said to be in balance with demand. Most distributors have caught up with heavy backlog of unfilled order commitments resulting from the long truck strike, and currently are on 2 to 3 days' shipping schedule for items on hand.

Cleveland — Loss of steel in the Pittsburgh area recently is becoming increasingly felt by local jobbers dependent upon the affected company's output. One interest says his deliveries are pushed back three weeks and that the steel loss cannot be made up. Overall demand continues as heavy as it has been, but there is some slackening in certain quarters. Small machine shops, in particular, are exerting less pressure.

Diversion of steel to railroad car builders is a subject of much criticism by warehouses stocking structurals and plates. This steel, according to these jobbers, is being supplied in too great quantities for the builders to use in view of their unbalanced supplies of such components as springs and wheels. Some of this or previously acquired tonnage, in jobbers' opinion, is finding its way into the gray market.

Chicago — With steel mills reporting increasing demand and no progress in catching up with backlogs, warehouses are faced with stronger demand as consumers seek to bolster their supply situation. Warehouse inventories are light and unbalanced, except for cold-finished products, stainless and alloys. Stocks of flat-rolled items are virtually nonexistent.

Cincinnati — Inventory position of warehouses is unimproved so that sales volume is now keyed to current shipments of wanted steel items.



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Pig Iron . . .

Pig Iron Prices, Page 132

Philadelphia—Shortage of pig iron is becoming increasingly pronounced, with consumers of basic as well as foundry grades having to limit production. Some foundries are using the occasion of the present stringency to make repairs. While there will be more working time in October, it appears likely that actual melt will be more limited than in the month now closing.

New York — With the larger of the two blast furnaces at Swedeland, Pa., down for repairs, district pig iron consumers are experiencing a squeeze which may force some to temporarily suspend operations before the end of the month. However, this suspension at Swedeland has improved the foundry coke situation somewhat, with a result that some foundries will be able to carry on in better degree than originally contemplated.

Meanwhile, there is little hope for relief in this district this year through shipments of iron from Daingerfield, Tex. This furnace is gradually getting in a position to produce, but it may be still another three or four weeks before it will be able to start up, and even then, it is understood, the first two or three months' output will be devoted almost entirely to requirements of southern pipe mills engaged in work for the housing program. It is reported that Daingerfield has more than 80,000 tons of iron on order for the southern pipe mills alone. It is estimated that the furnace will have a production of 800 to 1000 tons per day.

Foundry coke ovens in Daingerfield have been in operation for some time and tonnage has been shipped into this district and upstate New York at around $27 a ton delivered. However, some of this coke is said to have been a bit high in sulphur and therefore not too satisfactory to the northern buyers; however, the producer has since been able to reduce the sulphur content, it is understood.

Boston—While most basic consumers are still hard pressed for iron, there are fewer emergency calls for foundry tonnage. Although available supply each month permits little or no building of inventories against the coming winter, tonnage is sufficient for current melts in most cases, but the percentage of scrap in mixtures continues high. Melt is down slightly with some smaller jobbing shops, and gray iron order backlogs are generally lower. The volume of iron for New England is more or less fixed for the coming months with the 15,000 tons of foundry and malleable from Everett furnace the backbone of supply.

Pittsburgh—Critical pig iron shortage continues to retard foundry operations, resulting in complete shutdown for short periods in some instances, with estimated overall output averaging about 80 per cent of capacity. Due to the extremely tight supply situation in nearly all sections of the country, the prewar distribution pattern no longer prevails. Reflecting this condition, relatively little iron for foundry trade is shipped into this district. Merchant pig iron output continues under strict allocation and there is no indication of any improvement in the supply-demand relationship for months ahead.

Cleveland — Foundries are hard pressed to maintain operations here due to the tightening in pig iron supplies. Some interests will have to halt operations for several days early in October unless they receive unexpected shipments of iron in the meantime. Third quarter receipts generally were smaller than in the preceding like period. Producers are uncertain as to the volume that will be available for sale during the next three months. Several claim they are having difficulty in maintaining production due to the poor condition of furnaces, many of which need major repairs following a long period of uninterrupted operation. The recent blowing-in of one of Republic Steel Corp.'s furnaces here, following repairs and which will produce foundry iron, will tend to bolster the district's iron supplies. The foundries' position has been helped somewhat also by the fact that a few customers have lowered demands slightly due to improved inventories of castings.

Chicago — Any doubt about blast furnace production in this district being at an all-time high level is dispelled, with relighting by Inland Steel Co. on Sept. 18 of its No. 3 stack at Indiana Harbor, a unit idled on Aug. 1 for repair. Of the district's 42 blast furnaces, 41 are operating. This is believed to be an all-time high and corresponding capacity is known to be a record. Result is that more iron is available for both steelmaking and

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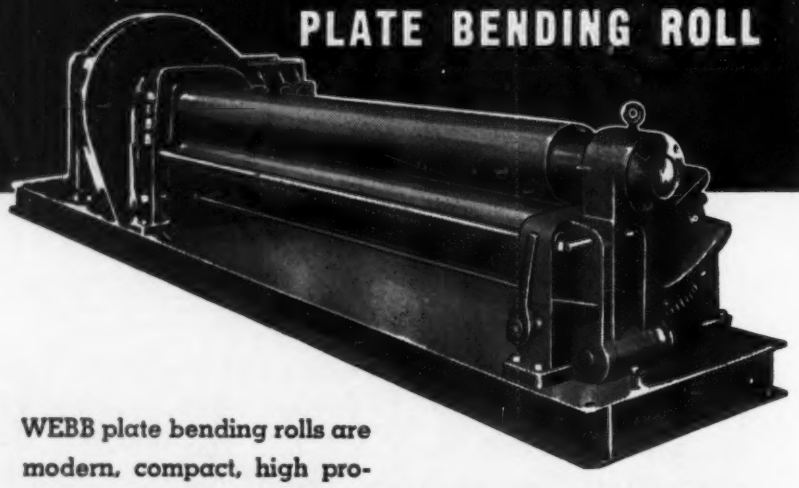

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sale. Foundries are so short of pig iron that immediate relief will not be discernible. With resumption of its No. 3 stack, Inland Steel is switching a smaller furnace from basic to malleable for 30 days, after which it will make spiegeleisen for a comparable period.

Buffalo — Unable to obtain adequate coke supplies, the top merchant iron producer in the area is not in a position to resume operations in a furnace banked two weeks ago. The producer reports the furnace is ready to go as soon as ample coke is available.

Cincinnati — Pig iron melters continue to press for more tonnage but allotments for October continue on the same levels, far below needs to meet demands for castings. Shipments into the district for the quarter were considerably under those of the second quarter because of the widespread tight supply situation. Furnaces are meeting commitments promptly.

Birmingham — The district's pig iron outlook continues anything but reassuring. First shipment of iron from the Daingerfield plant is due in late October. Tonnage on order is not disclosed but reliable sources say it probably will run into six figures.

Iron Ore ...

Iron Ore Prices, Page 132

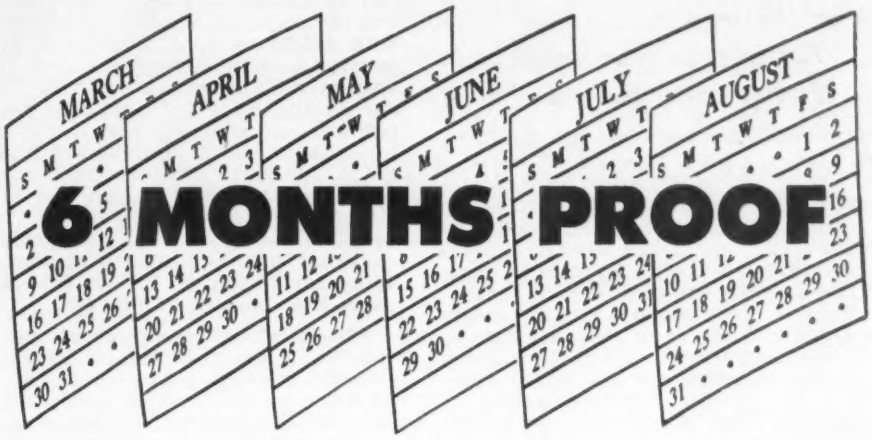
Cleveland—Shipments of Lake Superior iron ore declined slightly during the week ended Sept. 22 to 2,448,339 tons from 2,602,975 for the preceding week but showed an increase of 228,747 tons over the total for the like 1946 week, according to the Lake Superior Iron Ore Association, this city. Cumulative total for the season to Sept. 22 came to 58,733,386 tons, an increase of 18,170,562 tons over the like 1946 period. The cumulative total for the United States ports alone amounted to 57,541,379 tons, an increase of 17,859,755 tons over the like 1946 period.

Lake Superior Iron Ore Consumption Increases

Cleveland — Consumption of Lake Superior iron ore increased in August to 6,637,835 tons from 6,156,401 in July, making the total for the first eight months 53,024,888 tons compared with 37,440,730 in the like 1946 period. Consumption during August, 1946, was 6,738,409 tons, according to the Lake Superior Iron Ore Association. Furnaces in the United States accounted for 6,401,347 tons in August of this year and 51,122,453 in the first eight months while Canadian furnaces accounted for 236,488 tons and 1,902,435 tons in the respective periods.

Total stocks of Lake Superior iron ore as of Sept. 1 amounted to 33,896,462 tons compared with 28,440,332 tons a month earlier and 34,066,987 tons as of Sept. 1, 1946. Of the Sept. 1, 1947, total, 3,499,174 tons were on Lake Erie docks in the United States and 30,397,288 at furnaces, of which 29,096,633 tons were in this country and 1,300,655 in Canada.

As of Sept. 1, 168 furnaces were in blast and 15 idle in the United States while 9 were in blast and 1 idle in Canada, representing a gain of 1 furnace in blast in both countries.



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Scrap . . .

Firmer price tone develops in East despite generally quiet trading

Scrap Prices, Page 136

Philadelphia — While prices on heavy melting steel continue unchanged, tone of the market appears definitely stronger. Brokers in some cases are having to pay more for tonnage to apply against existing orders and are doing so at some expense to their commissions, and prices for top grade material are noticeably higher. In general, however, buying of melting steel is still quiet, with both buyers and sellers moving cautiously. In turnings the trend is upward with $29.50 to $30.50, delivered, appearing to be fairly representative but with even higher prices reported. This spread applies to both machine shop turnings and mixed borings and turnings. Short shovel turnings are higher at $30.50 to $31.50. Bar crops, punchings and plate scrap and cut structurals are slightly higher at $41.50 to $42.50 and in cast grades, charging box and heavy breakable scrap are higher at $46 to $47, and clean auto cast at $47 to $48.

Pittsburgh—Observance of religious holidays by scrap interests brought trading nearly to a standstill the past ten days, with collection and segregation of scrap similarly affected. Some higher priced orders still are being cleaned up, while only small lot purchases of heavy melting steel at $38 level is reported. Due to the fact insufficient tonnage of scrap is generated in this area, considerable volume of scrap continues to be shipped here from remote points at about the $40 to $41 range for heavy melting steel. Mills have been able to slightly augment scrap inventories in past two months, although stocks are still below normal for this season of the year. Persistent shortage of good quality scrap would indicate that prices may remain strong for immediate future. A slight easing in railroad heavy melting steel prices developed recently on basis of latest Pennsylvania railroad list award at $41.44 to broker. Scrap supply outlook has been brightened somewhat on basis of recent announcement that War Department expects to make available about 500,000 tons of scrap by July, 1948, through demilitarization of obsolete ammunition.

New York—Scrap brokers' buying prices were unchanged here last week, except machine shop turnings at $25.50 to $26, short shovel turnings at $27 to $27.50, and No. 1 cupola cast at $40. Consumers continued to limit purchases to such tonnages as they could pick up at recently unchanged prices. General undertone of the market appeared stronger, however.

Boston—The spread in heavy melting steel prices is in effect a premium for the better grades or a trend toward a return to the former differential between No. 1 and No. 2 material. For strictly No. 1, $32 and better is being paid, but some volume against old orders moves at $30.25. The trend in prices is somewhat firmer with turnings steady. Cast prices are mixed, depending on the needs of foundries and the immediate supply.

Chicago — In the absence of mill buying of any proportions, scrap prices continue untested, thus remain unchanged and nominal. The market has not yet reacted to the recent softer price trend in the East, although it has been reported that consumers have sought to purchase at a price $1 a ton lower than that prevailing. Brokers and dealers are now completing shipments on old orders placed at high prices, thus are just now getting squared around to consider new business. Prices might advance should consumers seek tonnage in any volume, but cognizant of the situation, buyers appear to be proceeding cautiously.

Buffalo — Confusion prevails in the scrap market as some of the leading dealers insist that the old OPA price formula be abandoned so that No. 1 heavy melting scrap is quoted on the basis of actual sales. A strong undertone dominates the market. Low phos was reported changing hands at $42 to $43 a ton, up $1.50. Dealers were turning down bids for additional business at the prevailing range of $37 to $38 a ton for No. 2 heavy melting and bundles. Meanwhile, No. 1 heavy melting is quoted at the prewar differential, or $2 higher, but two leading dealers reported sales as high as $42 a ton.

With a leading mill basing its pig iron price on steelmaking scrap, iron

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GEO. F. MARCHANT COMPANY
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consumers are opposed to splitting the price on No. 1 and No. 2 scrap. Fear is expressed that the mill will use the No. 1 scrap price instead of the overall price used under the OPA setup. Dealers, however, point out that No. 1 scrap is now commanding a higher price than No. 2 and should be quoted accordingly. Dealers point out that no No. 1 scrap is shipped to mills which place contracts with steelmaking grades quoted at one price.

Cleveland — Scrap material is moving freely to open hearths at current levels, all old contracts having expired. Undertone of the market is steady on steel grades but firm to strong on cast iron and foundry grades. Strength in the latter reflects the continued shortage of pig iron and the prospects of even a greater shortage in the near future.

Cincinnati — Iron and steel scrap prices were unchanged here last week. Mills have fair inventories and are resisting any attempts at increases. However, brokers and dealers sense a growing strength in the market, due directly to the high steelmaking rate and to desire of melters to augment stocks at the approach of winter.

Birmingham — Scrap moved definitely out of the headlines in this district in the past few weeks. Most scrap consumers complain that preparation generally is shoddy, but they have been too eager for scrap to say much about what they get. Currently, however, most requirements are being met and prices remain unchanged.

Seattle—The scrap supply continues a source of anxiety, although mills are obtaining supplies in proportion to consumption. However, the future looks none too promising. The Maritime Commission has called for bids Oct. 24 for 10 L.S.T.-type ships on Puget Sound and 30 in California waters, all to be broken up. These ships will produce about 30,000 tons of scrap. In Seattle, the Puget Sound Bridge & Dredging Co. finds the use of an old graving dock helpful in speedy and economical breaking up. A local war-built forge plant, which is casting ingots for export, is reported to be using 6000 to 7000 tons of steel scrap monthly, intensifying the supply situation.

Refractories . . .

Refractories Prices, Page 132

Cleveland—Basic Refractories Inc., Kelley Island Lime & Transport Co. and other leading producers of deadburned domestic dolomite have advanced prices 50 cents a ton to the basis of $11.05 at the basing points in Pennsylvania, West Virginia and Ohio.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 132

Pittsburgh—Beehive and oven foundry coke prices have remained firm and unchanged for the past few weeks, in contrast to the upward trend in quotations earlier this year. A major problem still facing blast furnace and foundry interests is the inadequate supply of good quality coke, a situation that will be accentuated by the indicated further expansion in overall requirements, notably from the foundry trade. Recent brief strike at H. C. Frick Co.'s Robena mine resulted in loss of about 40,000 tons of coking coal.

Further expansion in coke oven operations is scheduled for Clairton plant of Carnegie-Illinois Steel Corp., already largest coke producing plant in the world with daily capacity of over 30,000 tons. Carnegie-Illinois has awarded Koppers Co. Inc., Pittsburgh, a contract for construction of a new battery of 85 coke ovens and the rebuilding of a 61-oven battery at this plant. The new battery is scheduled for completion by November, 1948, and the rebuilding of 61-oven No. 18 battery should be completed in about 14 months. The contract for the new battery also provides for building coal and coke handling equipment, machinery and auxiliary units.

Initial phase of Crucible Steel Co.'s coke oven expansion program at its Midland, Pa., Works was completed last week with the lighting of a new battery of 21 by-product coke ovens. Work on 63 additional ovens is continuing and is expected to be completed by October, 1948. When the program is completed, the company will have 184 by-product coke ovens at this plant.

Ferroalloys . . .

Ferroalloy Prices, Page 133

Birmingham — Sloss-Sheffield Steel & Iron Co. has increased the price of ferromanganese $10 a ton, effective as of Oct. 1. The new price for the 78 to 82 per cent grade in carlots is $1.45, fob cars, this city.

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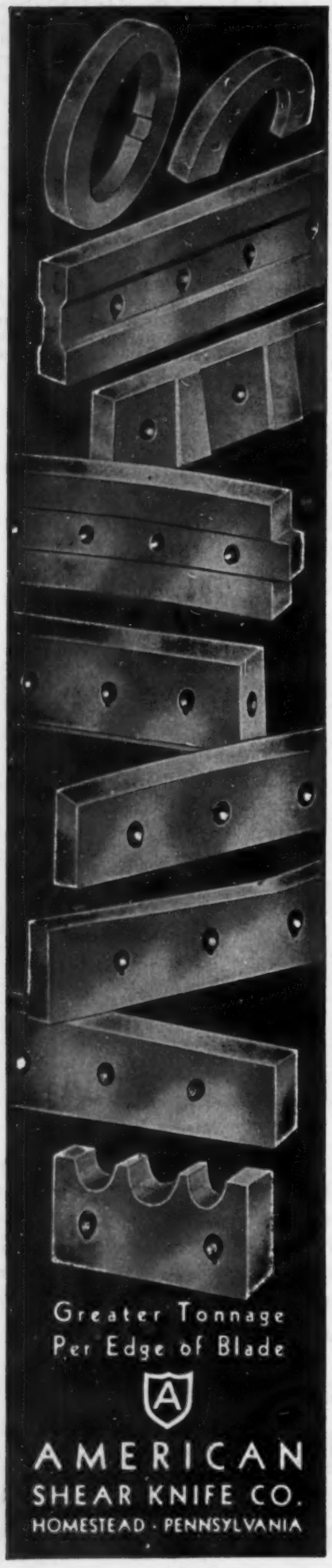

Canada Increases Steel Scrap Prices about $5 a Ton

Ottawa, Ont.—Steel scrap prices advanced about $5 per gross ton in Canada last week, effective as of Sept. 24, according to an announcement by the Prices Board. Taken on the recommendation of the Steel Control, the action includes a number of changes in dealers' allowances for preparation of charging box size of heavy melting steel scrap as well as the maximum commission they are permitted to charge.

For Ontario and Quebec, mixed steel scrap prices have been increased to $19 per gross ton at Hamilton and Montreal, basing points. All other classifications have been advanced $4.50 per gross ton and preparation allowance for No. 1 heavy melting steel scrap is now $3 per gross ton. Dealers' commissions have advanced from 50 cents to a total of $1.

In the prairie provinces and British Columbia, mixed steel scrap has increased $3 per net ton with a new preparation allowance of $3 per net ton for No. 1 heavy melting and $2 for No. 2 heavy melting. All other grades have advanced $4.25 a net ton.

Consumers To Receive More Steel This Year Than Last

(*Concluded from Page* 47)

amount they received in the full year 1946.

First half shipment to the oil and gas drilling industry totaled 439,463 tons, compared with 316,366 tons in the full year 1946. Receipts, in net tons, by other steel consuming industries for the first half this year, and for the full year 1946 follow:

	6 mos. 1947	1946
Construction	3,035,337	4,767,703
Converters, processors	2,488,512	3,794,392
Containers	2,459,085	4,255,287
Machinery, tools	1,637,010	2,415,517
Electrical Machinery	798,773	1,154,506
Contractors products	1,128,253	1,618,739
Appliances, utensils, cutlery	774,655	1,227,154
Other domestic equipment	845,452	1,398,055
Exports	2,086,260	3,026,771

Guaranteed Annual Wage Implies Planned Economy

(*Continued from Page* 51)

areas occupied by present job holders whether or not they represented the most productive—that is the most progressive—use of materials and manpower.

"A young and growing nation is marked by confidence in the ability of its individuals to create opportunities for expanding output and im-

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SOUTHERN GALVANIZING CO., BALTIMORE

MICHIGAN
RIVERSIDE FOUNDRY & GALV. CO., KALAMAZOO

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COLUMBIAN STEEL TANK CO., KANSAS CITY
MISSOURI ROLLING MILL CORP., ST. LOUIS

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INDEPENDENT GALVANIZING COMPANY, NEWARK

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OHIO
THE FANNER MFG. CO., CLEVELAND
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THE WITT CORNICE COMPANY, CINCINNATI
COMMERCIAL METALS TREATING, INC., TOLEDO

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LEHIGH STRUCTURAL STEEL CO., ALLENTOWN
PHILA. RANGE BOILER & TANK CO., COATESVILLE
AMERICAN TINNING & GALVANIZING CO., ERIE
HANLON-GREGORY GALVANIZING CO., PITTSBURGH
OLIVER IRON & STEEL CORP., PITTSBURGH
PENN GALVANIZING COMPANY, PHILADELPHIA

TENNESSEE
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proving economic levels. What it seeks mainly to protect is the sporting chance—the freedom of opportunity to make the most of one's ability. The emphasis on insurance of status is likely to develop as confidence in the rewards of individual enterprise gives way to fear that there may not be enough to go around unless the shares in the total product are rationed. The general guarantee of jobs and payrolls implies the general acceptance of fixed placements in a regulated economy. A basis decision to be made, before widespread guarantees are instituted in any but the already consumer lines, concerns the kind of economic order we are prepared to accept in order to insure existing jobs and payrolls."

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

4200 tons, superstructure, South Capitol street bridge, Washington, D. C., to American Bridge Co., Pittsburgh, $2,329,043.50; also required for this project are machinery in swing span, 100 tons; reinforcing steel, 350 tons; roadway grating in swing span, 16,000 square feet; and bridge railings, 7700 linear feet.

1350 tons, improvements to New York Central railroad station, Toledo, O., to Duffin Iron Co., Chicago; Duffy Construction Corp., Cleveland, general contractor.

650 tons, garage, Connecticut Co., New Haven, Conn., to Topper & Griggs, New Haven.

520 tons, manufacturing building, Cluett Peabody & Co., Atlanta, Ga., through George A. Fuller & Co., New York, to Bethlehem Steel Co., Bethlehem, Pa.

500 tons, addition, Hershey Chocolate Co., Hershey, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

400 tons, crane runway, Otis Elevator Co., Harrison, N. J., to American Bridge Co., Pittsburgh.

350 tons, power plant, Rockland Power & Light Co., Nyack, N. Y., to Belmont Iron Works, Eddystone, Pa.

284 tons, box factory, Self-Locking Carton Co., Morris, Ill., to Duffin Iron Co., Chicago; Herlihy Mid-Continent Co., Chicago, contractor.

200 tons, mine shaft, Balmat, N. Y., through Underpinning & Foundation Co., New York, to Bethlehem Steel Co., Bethlehem, Pa.

180 tons, foundry building, Oliver Corp., South Bend, Ind., to Mississippi Valley Structural Steel Co., Decatur, Ill.; H. G. Christman Construction Co., South Bend, Ind., contractor.

170 tons, pipe racks, Carbide & Carbon Chemical Corp., Texas City, Tex., to Bethlehem Steel Co., Bethlehem, Pa.

165 tons, library addition, Duke University, Durham, N. C., to Bethlehem Steel Co., Bethlehem, Pa.; J. A. Jones Construction Co., Charlotte, N. C., general contractor.

160 tons, plant addition, National Aniline Division, Allied Chemical & Dye Corp., Buffalo, to Frank M. Weaver & Co. Inc., Lansdale, Pa.

110 tons, Bell Telephone addition, Llanerch, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

100 tons, New York Central bridge, Massena, N. Y., to American Bridge Co., Pittsburgh.

100 tons, New York Central bridge repairs, Canton, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

STRUCTURAL STEEL PENDING

4000 tons, hospital for Chronic Diseases, Department of Public Works, Welfare Island, New York City, pending.

4000 tons, East River Drive, 18th to 25th

AS SIMPLE AS A-B-C

Gerrard Galvanized Round Steel Strapping is Reinforcement SIMPLICITY. Gerrard Round Steel Strapping is its own reinforcement, the Gerrard Tie being an integral part of the strapping itself. There are no seals and no crimping to fool with, thus bringing strapping labor to a mere tensioning and twisting of the Gerrard Straps.

Gondola car of steel bars Gerrard-strapped in bundles.

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It costs 30% to 55% less than any other metal reinforcement on the market and we can prove it.

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GERRARD STEEL STRAPPING COMPANY

4745 SOUTH RICHMOND ST. (formerly The Gerrard Company Inc.) **CHICAGO**

THE DEMPSTER-DUMPSTER SYSTEM OF MATERIALS HANDLING not only permits the use of any number of detachable bodies to be serviced by one truck hoisting unit, but you can have any special type of body you need to meet your particular requirements to do the job quicker, easier and at far less cost. Many different types of bodies, four of which are pictured at left, are built for handling every conceivable type of materials from light, bulky to extremely heavy, as well as for liquid or dust. Capacities 1½ to 10 cu. yds. and up to 8 Tons pay load.

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TRADE MARK REG.

DEMPSTER BROTHERS, INC.

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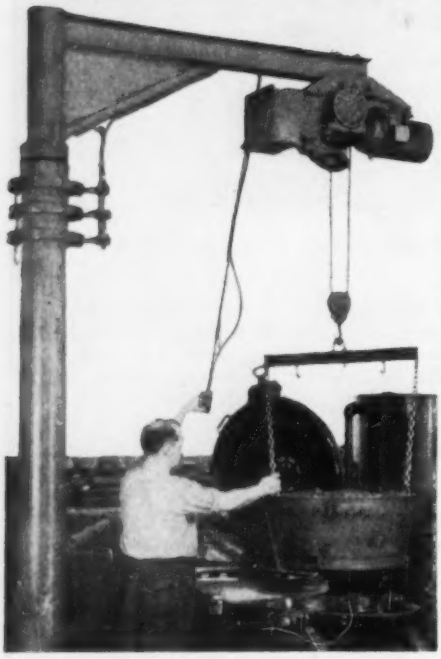


Here's a materials handling problem that was solved by a Reading Electric Hoist with a 360° swing jib crane. Large quantities of metal turnings were processed for oil removal. Speedy handling was necessary.

A Reading Electric Hoist was selected for power and hoisting speed. Reading engineers also designed the 360° swing for the crane to speed up loading and unloading.

For help in materials handling problems that involve hoisting, write for bulletin, "144 Answers To Your Hoisting Problems".

READING CHAIN & BLOCK CORP.
2102 ADAMS STREET READING, PA.

READING HOISTS

Sts., New York city, pending.

2500 tons, terminal, Port of New York Authority, Newark, N. J.; bids closed.

2500 tons, hospital, Kings county, New York city; bids asked.

1800 tons, Industrial Development Corp., Hazelton, Pa.; bids in.

1600 tons, hangars, Southwest airport, Philadelphia; bids Oct. 8.

1400 tons, Auto Light Co., Philadelphia; pending.

1000 tons, General Electric atomic unit, Knolls, N. Y.; bids asked.

600 tons, Public School No. 133, Manhattan, New York city; bids asked.

475 tons, sheet piling, Garrison Dam, Riverdale, N. Dak., for U. S. Engineer; Carnegie-Illinois Steel Corp., Chicago, low; bids Sept. 5.

400 tons, building, Threshermen & Farmers Equity Insurance Co., Harrisburg, Pa.; bids in.

300 tons, Brownsville Medical Center, Brooklyn, N. Y.; bids asked.

260 tons, Washington state highway truss span, Lewis county; bids in at Olympia, Sept. 23.

250 tons, steel trusses and girders for railroad transfer bridge, near Tacoma, Wash.; bids to U. S. engineer, Seattle, Oct. 14.

250 tons, including joists, warehouse, N. Brenner & Son, Harrisburg, Pa.; bids in.

238 tons, New Jersey state underpass; bids closing at Trenton, N. J., Oct. 8.

150 tons, municipal bridge, 70th St., Philadelphia; pending.

135 tons, hotel, Green Harbor, Marshfield, Mass.

120 tons, repairs, Pennsylvania Railroad bridge, Perryville, Md.; pending.

100 tons, municipal bridge, 20th St., Philadelphia; bids Sept. 30.

Unstated, substructure, Stage 1, N. State St. viaduct, Department of Public Works, Chicago; bids Oct. 2.

Unstated, trashrack and stop log equipment, for Long Lake and Potholes dams, Columbia Basin project; bids to Bureau of Reclamation, Denver, Oct. 9; spec. 1952.

Unstated, miscellaneous steel for switchboard and other equipment, Black Canyon power plant, Boise project; bids to Bureau of Reclamation, Denver, Oct. 14.

REINFORCING BARS . . .

REINFORCING BARS PLACED

700 tons, Dorena dam, Oregon, to Northwest Steel Rolling Mills Inc., Seattle; Guy F. Atkinson Co., San Francisco, general contractor.

400 tons, bridge, Milan, Ill., for State Highway Department, to Joseph T. Ryerson & Son Inc., Chicago; Superior Concrete Construction Co., Chicago, contractor.

130 tons, filtration plant, Port Washington, Wis., to Joseph T. Ryerson & Son Inc., Chicago; Joseph J. Duffy Co., Chicago, contractor.

100 tons, improvements to New York Central railroad station, Toledo, O., to Republic Structural Iron Works, Cleveland; Duffy Construction Corp., Cleveland, general contractor.

REINFORCING BARS PENDING

4564 tons, contracts 3 to 4, South Side Intercepting sewer, Sanitary District of Chicago; bids of Sept. 11 rejected; new bids Oct. 23.

4500 tons, Lillian Wald Houses, New York; Knickerbocker Cement Arch Co. in charge of concrete work.

1530 tons, University of Washington medical center, Seattle; bids in.

1500 tons, Boysen dam, Bonneville, Wyo., for U. S. Bureau of Reclamation; bids Aug. 20.

600 tons, Aero building, University of Minnesota, Minneapolis; bids Oct. 3.

430 tons, tuberculosis hospital, Selah, Wash.; General Construction Co., Seattle, low, $1,726,280.

370 tons, store building, Red Owl Stores Inc., Fargo, N. Dak.; Standard Construction Co., Minneapolis, low on general contract.

150 tons, loading dock, Wilson & Co., Albert Lea, Minn.; bids in.

150 tons, state overcrossing, Yakima county, Washington; M. P. Munter Co., Seattle, low, $128,786.

100 tons or more, state patrol testing station, Seattle; W. G. Clark Co., Seattle, general contractor, low, $445,300.

100 tons, Washington state highway projects; bids in Sept. 23.

Unstated, substructure, Stage 1, N. State St. viaduct, Department of Public Works, Chicago; bids Oct. 2.

PLATES . . .

PLATES PLACED

20,300 tons, tanks, Texas Co., New York, for installation at Deptford, N. J., 16,300 tons for 80 tanks, going to Bethlehem Steel Co., Bethlehem, Pa., and 4000 tons for 6 tanks to the Hammond Iron Works, Warren, Pa.

113 tons, oil storage tank, Canlake Petroleum Corp., North Tonawanda, N. Y., to the Bethlehem Steel Co., Bethlehem, Pa.

PIPE . . .

STEEL PIPE PLACED

453 tons, welded steel pipe, spec. 1908-Utah, for Bureau of Reclamation, Denver, to Western Pipe & Steel Co. of California, San Francisco.

CAST IRON PIPE PENDING

550 tons, assorted sizes, for Seattle water department; bids opened Sept. 18.

Unstated, 9000 feet of 20 in. cast iron pipe (or alternate); bids to Walla Walla, Wash., water department, Oct. 1.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Canadian Pacific, 10 passenger-freigh Pacific locomotives and 12 heavy-freight Mik do locomotives, to Montreal Locomotive Works Ltd., and 30 lighter Pacifics to Canadian Locomotive Co. Ltd., Kingston, Ont.

Seaboard Airline, 21 diesel-electric locomotives, with twelve 2000-horsepower locomotives going to Electro-Motive Division, General Motors Corp., La Grange, Ill., and six 1500-horsepower freight engines and three 1000-horsepower switch engines to American Locomotive Co., New York.

RAILROAD CARS PLACED

Canadian Pacific, $4 million for box cars, $2 million for 175 refrigerator cars, $750,000 for 100 covered hopper cars to National Steel Car Corp., Hamilton, Ont.; 10 mail-express cars and 10 baggage-express cars to Canadian Car & Foundry Co. Ltd., Montreal; and 50 hoppers to Eastern Car Co., Trenton, N. S.

Chicago Heights Terminal Transfer, 25 seventy-ton covered hopper cars, to General American Transportation Corp., Chicago, and 15 seventy-ton gondola cars to Pressed Steel Car Co., Pittsburgh.

Chicago, Milwaukee, St. Paul & Pacific, 750 auto box cars, to own shops.

Erie Railroad, 700 box cars and 1000 hopper cars to American Car & Foundry Co., New York, and 100 covered hopper cars to Ralston Steel Car Co., Columbus, O.

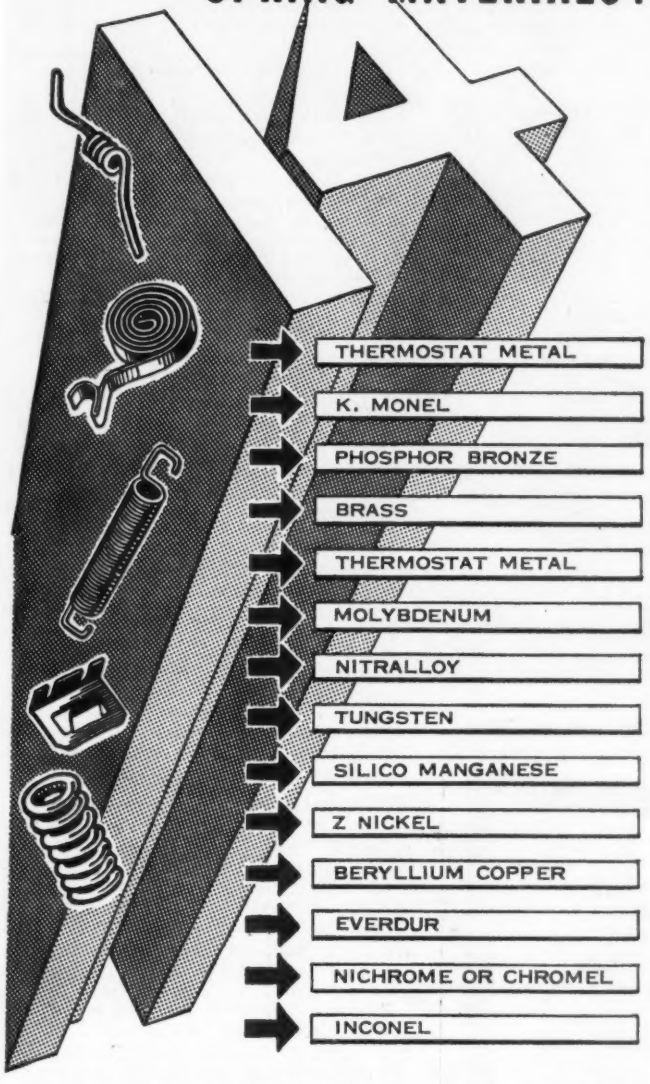
St. Louis-San Francisco, 500 hopper cars and 300 box cars, to Pullman-Standard Car Mfg. Co., Chicago, and 300 fifty-five ton and 200 seventy-ton hopper cars to Pressed Steel Car Co., Pittsburgh, for construction at its Mt. Vernon, Ill., shops.

RAILROAD CARS PENDING

New York Central, 3000 cars, including 2000 55-ton self-clearing hopper cars for Central's ownership and 1000 70-ton self-clearing hopper cars for Pittsburgh & Lake Erie railroad.

Seaboard Airline, 300 high-side solid-bottom gondolas, and 100 low-side solid-bottom gondolas; bids asked.

DO YOU KNOW WHEN AND WHERE TO USE THESE 14 SPRING MATERIALS?



Somewhere in this list may lie the answer to better spring performance for your mechanism. Based on a knowledge of what these materials will do under conditions of corrosion, atmospheric changes or conductivity, Raymond engineers can recommend springs designed and built for specific service. Check your specifications with Raymond today for safety and service.

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WIRE FORMS — SMALL STAMPINGS

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DIVISION OF ASSOCIATED SPRING CORPORATION
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SMALL... *extra payload* SIZE

THAT'S an exact description of these BCA ball bearings. BCA designed them specifically for the transmission of the Bell Helicopter. They are assembled in matched pairs on the shafts of the first and second planetary gears to take radial and thrust loads in either direction. Each of these BCA ball bearings is smaller than a silver dollar, yet they withstand service conditions that normally call for considerably larger bearings. Inner and outer races are matched to 1/10,000 of an inch.

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CONSTRUCTION AND ENTERPRISE

CALIFORNIA

BERKELEY, CALIF.—Armco Drainage & Metal Products, Seventh and Parker Sts., plans to build a $55,000 crane building.

LOS ANGELES—Maas Steel Corp. has been organized with a capital of $500,000 by Arthur F. Maas and associates. Firm is represented by Bailie, Turner and Lake, 811 Citizens National Bank Bldg.

ILLINOIS

CHICAGO—Clearing Machine Corp., 6499 W. 65th St., is embarking upon a $500,000 expansion program which will include purchase of land, new construction and renovation.

INDIANA

GARY, IND.—Gary Screw & Bolt Division, Pittsburgh Screw & Bolt Co., Seventh Ave. and Alabama St., suffered a fire in three of its buildings recently which caused damage estimated at $500,000. Major damage was to machinery.

INDIANAPOLIS—American Can Co. plans to build a $1,500,000 plant here adjacent to its present facility.

MICHIGAN

BYRON, MICH.—L. M. Holloway Mfg. Co. has been formed by L. M. Holloway with a capital of $65,000 to manufacture power movers and machinery.

DETROIT—Fred Saunders Co. has awarded a $250,000 contract to A. A. Albrecht Co. for an alteration project.

DETROIT—Amplex Division, Chrysler Corp., has awarded a contract for construction of a factory addition to Couse & Westphal. Plans are by Albert Kahn Associated architects and Engineers.

DETROIT—Wallace J. Ivers Co., 8830 Mark Twain Ave., has been formed by Eda R. Ivers with a capital of $50,000 to engage in a metal plating business.

DETROIT—Midwest Supply & Mfg., 1641 Howard St., has been formed by George R. Carlson with a capital of $50,000 to manufacture tools.

DETROIT—Elite Tool Co., 6460 Benham St., has been formed by William J. Peppers with a capital of $100,000 to manufacture tools and dies.

DETROIT—Pamac Inc., 3548 Mitchell Ave., has been formed by Ed Snethkamp with a capital of $50,000 to manufacture and sell metal products.

GRAND RAPIDS, MICH.—Corduroy Rubber Co. plans to build a $50,000 plant addition. Architect is Daverman Co.

MORLEY, MICH.—Reliance Metal Products Co. Inc. has been formed by Maynard W. Tucker with a capital of $50,000 to manufacture and process metals.

VAN DYKE, MICH.—Consolidated Plastics Co., 22808 Sherwood Ave., has been formed by William H. Bagley Jr. with a capital of $50,000 to manufacture plastics.

MISSOURI

ST. LOUIS—Century Electric Co., 1806 Pine St., plans to build a 3-story industrial unit on Olive St., between 18th and 19th Sts. Plans are by L. Baylor Pendleton and W. B. Ittner, architects and engineers.

NEW MEXICO

JAL, N. MEX.—Texas Pipe Line Co. & Associates, Texas Bldg., Houston, Tex., will build 498 miles of 20-in. crude oil pipeline between Jal and Cushing, Okla. Cost is estimated at $22,500,000.

JAL, N. MEX.—Texas Pipe Line Co., Shell Pipe Line Corp., Empire Pipe Line Co. and Sinclair Refining Co., all in Texas Bldg., Houston, have awarded an $83,000 contract to Chicago Bridge & Iron Co., 5625 Clinton Dr., Houston, for the construction of storage and warehousing facilities here.

OHIO

CLEVELAND—Pesco Products Division, Borg-Warner Corp. plans to begin construction soon on a $120,000 laboratory for testing aircraft fuel systems in Bedford Township.

OKLAHOMA

BECKETT, OKLA.—Sunray Oil Corp., Philtower Bldg., Tulsa, plans to build a 93-mile, 6-in. crude oil pipeline between Beckett and Allen. Cost is estimated at $900,000.

TULSA, OKLA.—Sunray Oil Corp., Philtower Bldg., is contemplating the following construction projects: $150,000 booster station at Allen, Okla.; $125,000 booster station at Beckett, Okla.; $160,000 booster station at Wynne Wood, Okla.; $1,175,000 refinery modernizations and extensions at Duncan, Okla.

PENNSYLVANIA

BEAVER, PA.—Westinghouse Electric Corp., Union Bank Bldg., Pittsburgh, has awarded a $75,000 contract to Dick Construction Co., 2530 Library Rd., Pittsburgh, for the erection of an extension to its manufacturing building.

PHILADELPHIA — Joseph Ryerson, 5200 Grays Ave., plans to spend $55,000 on plant additions.

PITTSBURGH—J. H. Mathews Co., 1315 W. Liberty Ave., has awarded a $100,000 contract to Edward Crump Inc., 4031 Bigelow Blvd., for the construction of a manufacturing building. Architect is J. E. Tillotson.

PITTSBURGH—Jones & Laughlin Steel Corp., Third and Ross Sts., has awarded a $4 million contract to Rust Engineering Co., Clark Bldg., for the design and construction of a boiler house and facilities for three steam generators at the South Side Works.

TEXAS

DALLAS, TEX.—Texas & Pacific Railway, R. J. Gammie, chief engineer, Texas & Pacific Bldg., will spend $3,287,000 in relaying 130 miles of 115 lb and 132 lb steel railroad tracks between Dallas and El Paso.

HEARNE, TEX.—Humble Oil & Refining Co., Transit Tower, San Antonio, plans to build 170 miles of 6-in. products pipeline between Hearne and San Antonio. Cost is estimated at $2,040,000.

MIDLAND, TEX.—Texas Pipe Line Co., Shell Pipe Line Corp., Empire Pipe Line Co. and Sinclair Refining Co., all in Texas Bldg., Houston, have awarded an $85,000 contract to Chicago Bridge & Iron Co., 5625 Clinton Dr., Houston, for the construction of a storage and warehousing facility here.

OAKVILLE, TEX.—Western Natural Gas Co., P. Kayser, president, Chronicle Bldg., Houston, has awarded a $750,000 contract to Refinery Maintenance Corp., Compton, Calif., for the construction of a mechanical process plant here.

SAN ANTONIO, TEX.—Sinclair Oil & Refining Co., Gulf Bldg., Houston, plans to build 85 miles of 6-in. products pipeline between San Antonio and Luling. Cost is estimated at $1,250,000.

WICHITA FALLS, TEX.—Panhandle Refining Co., P. O. Box 191, plans to reconstruct its warehousing, machine and welding shop units at a cost of approximately $150,000.

WINK, TEX.—Richardson & Bass Associates, National Bank Bldg., Ft. Worth, have awarded a $1,750,000 contract to Jones & Laughlin Supply Co., 108 N. Trenton St., Tulsa, Okla., for the construction of a natural gasoline plant here.

WINK, TEX.—Texas Pipe Line Co., Shell Pipe Line Corp., Empire Pipe Line Co. and Sinclair Refining Co., all in Texas Bldg., Houston, have awarded a $70,000 contract to Chicago Bridge & Iron Co., 5625 Clinton Dr., Houston, for the construction of a storage and warehousing facility here.

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Embodies similar design principles and features of MARVEL heavier duty production saws. Its shaper-link action that provides quick return stroke, and its heavy pressure screw feed are two exclusive MARVEL features that provide FASTER cutting than can be obtained with any other metal saw in its price class.

Single speed, 2-speed, and 4-speed models are available, to suit all types of applications where materials of different hardness and alloy characteristics are to be cut. Cabinet base or open-leg base are optional.

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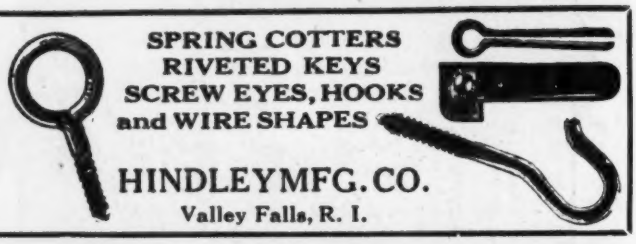

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100 tons 2 x 2 x 3/16" Angles 16 to 22'
100 tons 2 x 2 x ¼" Angles 16 to 22'
74 pcs. 8 x 4 x 7/16" Angles 60'
65 pcs. 8 x 4 x 7/16" Angles 12 to 34'

25 tons 10" BP Beams 42# Random Lengths
25 tons 12" BP Beams 73# Random Lengths
75 tons 14" BP Beams 73# Random Lengths
50 tons 14" BP Beams 102# Random Lengths

24 pcs. 6" Jr. Beams 4.4# 40'
218 pcs. 10" Jr. Beams 9# 20'
119 pcs. 10" Jr. Beams 9# 40'
36 pcs. 12" Jr. Beams 11.8# 30'
68 pcs. 12" Jr. Beams 11.8# 60'

15 tons 5 x ½" Flat Bars 20 to 24'

75 pcs. ⅜ x 8" U M Plates 20 to 21'
45 pcs. ⅜ x 10" U M Plates 20 to 21'
60 pcs. ½ x 8" U M Plates 20 to 21'
136 pcs. ½ x 12" U M Plates 20 to 21'
171 pcs. ⅝ x 12" U M Plates 20 to 21'
68 pcs. ¾ x 12" U M Plates 20 to 21'
46 pcs. 1 x 12" U M Plates 20 to 21'
50 tons ⅜" Plate Ends large sizes
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Sheet size 40" and wider

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25 Ton	7/16"	RD	CR
25 Ton	5/8"	RD	CR
10 Ton	3/4"	RD	CR
10 Ton	1-1/8'	RD	CR
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40 Ton	1-1/2"	RD	CR
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160,000	½"	.028"	16 ft.	E. W. 1010	.03
100,000	½"	.035"	20 ft.	S. S. 1025	.04½
100,000	⅝"	.065"	20 ft.	E. W. 1010	.07½
50,000	¾"	.065"	20 ft.	E. W. 1010	.08¼
75,000	1"	.065"	13 ft.	E. W. 1010	.08½
75,000	1⅛"	.032"	4 ft.	E. W. 1010	.05
200,000	1⅛"	.115"	9 ft.	S. S. 1015	.11
30,000	2⅛"	.049"	20 ft.	E. W. 1010	.13
10,000	3½"	.065"	20 ft.	E. W. 1010	.25
15,000	4"	.065"	20 ft.	E. W. 1010	.27
20,000	4"	.083"	20 ft.	E. W. 1010	.44
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Sales agents or manufacturers' representatives needed by large manufacturer of seamless and welded specialty tubing in carbon steel, alloy, and stainless grades in the following city:

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Applicants must have steel commodity sales experience preferably on tubing and/or on alloys and stainless, and must be presently located in Boston. All applications will be treated in confidence. Apply to Box 206, STEEL, Penton Bldg., Cleveland 13, O.

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OR PARTS AND DEVELOPMENT ONLY

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Blooming mill power cost cut 3¢ per ton

BY reducing friction at the roll necks through positive lubrication, a Farval centralized lubricating system can save thousands of dollars a year in power costs.

On one 40″ blooming mill, for example, the records show that power cost per ton of steel rolled was lowered 3.1¢ by installing Farval. On the basis of tonnage rolled, it took less than 3½ months for the Farval system to pay for itself.

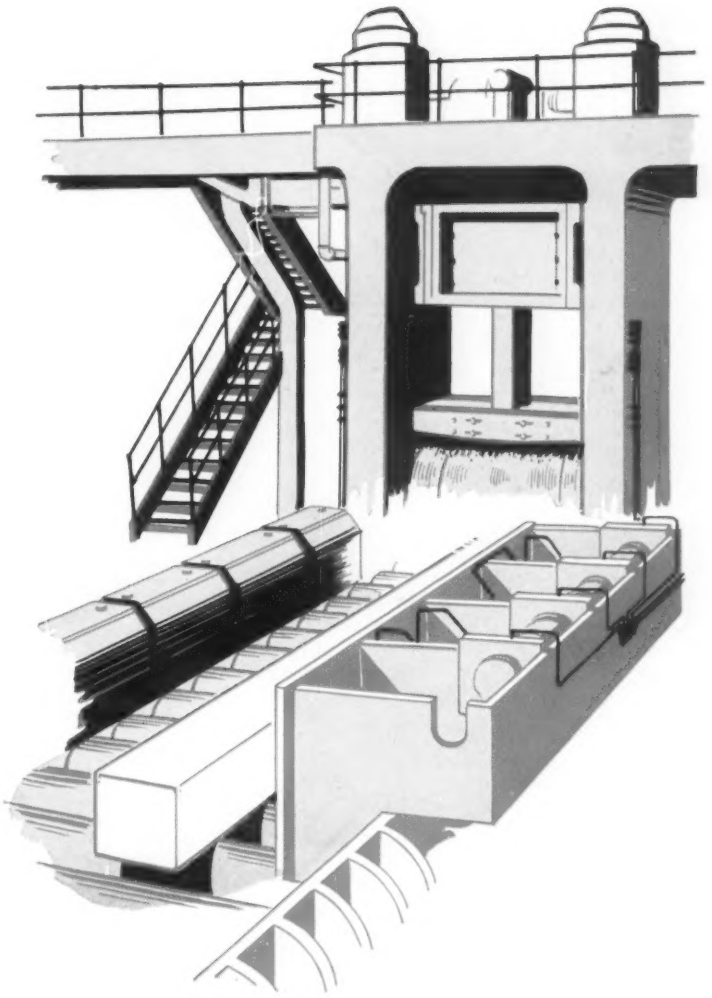
Farval was installed to automatically lubricate the bearings on both the blooming mill and the tables, all motor driven. Power is supplied by the company's own plant, at ½¢ per kw-hr. Here are the vital "before and after" figures:

Method of lubrication employed	Cost of power for one year	Tons of steel rolled in year	Power cost per ton of steel
Roll necks hand packed .	$42,300	470,000	$.090
Centralized lubrication . .	$37,170	630,000	$.059
Saved in power cost per ton with Farval .			$.031
Total power saving on 630,000 tons rolled			$19,530
Total cost of Farval installation			$ 5,500

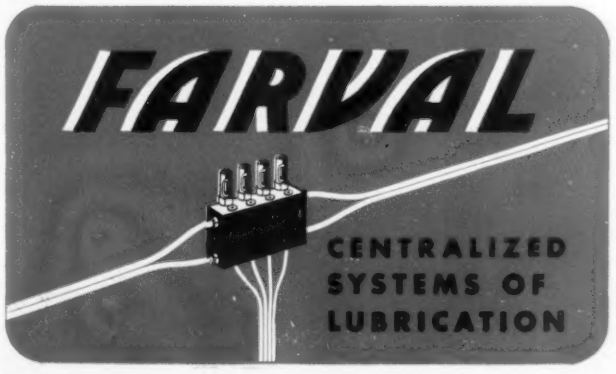
To measure the full value of Farval, to the savings on power should be added the savings in labor of oiling, the savings in lubricant, the increased life of bearings and the increased tonnage produced through the elimination of mill delays and shutdowns for bearing replacement.

Farval delivers oil or grease under pressure to a group of bearings from one central station, in exact quantities, at regular intervals. Farval is the Dualine System with the Positive Piston Displacement Valve. This valve has but two moving parts and is fully adjustable, with a Tell-tale indicator at each bearing to show the job is done. For a full description of Farval, write for Bulletin 25. The Farval Corporation, 3270 East 80th Street, Cleveland 4, Ohio.

Affiliate of The Cleveland Worm & Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers, Limited.



FARVAL—*Studies in Centralized Lubrication* No. 91



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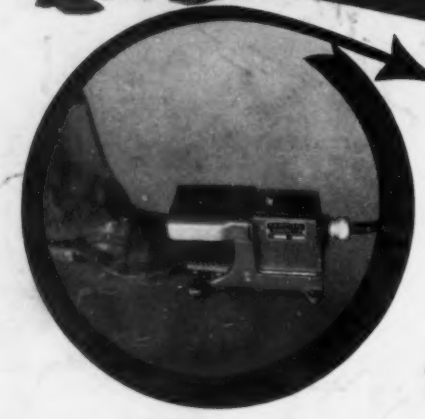

Series No. 410 Shear for cutting steel plate up to 3/8" x 10'-0"

The electric foot switch is one of the many features that makes operation of Steelweld Shears easier and faster. It can be slid around the floor to wherever most convenient. Only a slight movement of the toe is required to operate it. This feature is standard on all Steelweld Shears, and is furnished at no extra cost.

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Like a modern streamlined engine as compared to an old-time locomotive, or a luxury liner versus a tramp freighter, so will you find these new shears as compared to all power shears you have ever used before.

Here at last is something new in shearing history — a great advancement in design and performance — the only truly basic change for many decades.

Not only are these new shears easier to operate but their design assures smooth straight cuts to hair-line accuracy for years of operation. Their construction is extra heavy and all modern features are incorporated to provide for ease of operation, minimum maintenance and long life.

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GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

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